FALCON Pilot

Applying Open Standards for PLM Systems Interoperability

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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Report Documentation Page

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14. ABSTRACT

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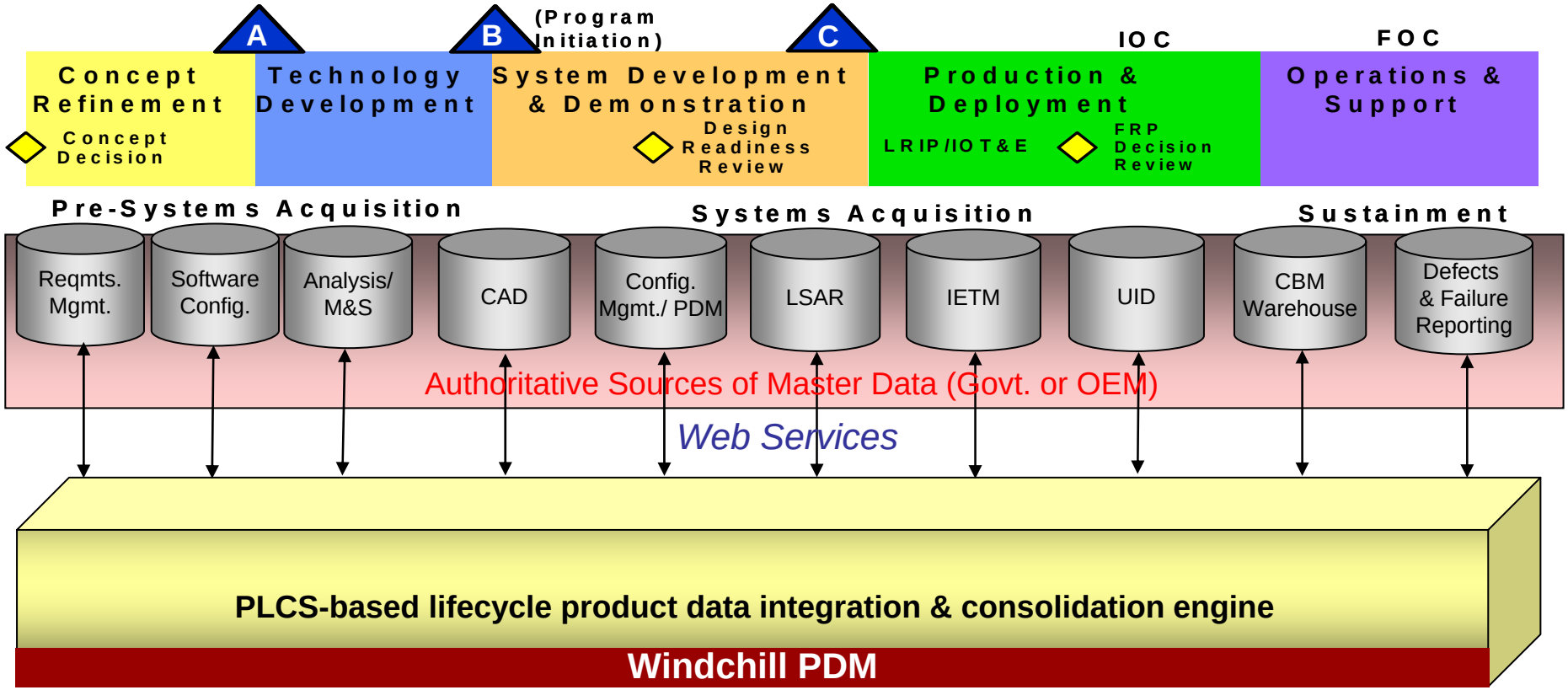
Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

Objectives

- Present the FALCON approach:
  - the application of the PLCS standard and Share-A-space technology as a “master data integrator” within the Falcon Program Architecture
- Demonstrate:
  - Improved data communication from AM General to TARDEC
  - Visibility of richer design data sets to TARDEC
    - Ability to compare
  - Access to details of individual delivered vehicles

Cross Domain Product Data Integration



Lifecycle Applications

- Collaboration
- Modeling & Simulation
- Configuration Management
- Product Improvements
- CAVE
- Online Design Reviews
- Data Validation
- What-if Analysis
- Spare Part Buys
- Readiness Prediction
- DLA Buys
- Provisioning
- Cataloging
- Depot Reset/ Recap
- Field Repair & Maintenance

Background: the existing process

- The Army receives design data as drawings (pdf files)
- Drawings are held by the Army in Windchill
  - Corresponding meta data is entered manually
- Product structure is supplied as indented parts lists
  - Corresponding data is entered manually into Windchill
- LSAR data is also provided as 1388-2B
  - Including Initial Provisioning Lists (as a report)
- Change documentation held in the Windchill system
  - Other intermediate changes made by AMG held in SAP
- What happens in AM General is not seen by the Army
  - Changes to HMMWV design for manufacturing not delivered to Army by contract
  - Approved changes do not necessarily get into manufacture

Old way of doing business

Manufacturing

As-built config

ECP

New design

OEM

Design change made in 3D CAD

Design configuration controlled within PDM

PDM

As-designed config

2D CAD drawings developed

PDF files generated

Drawing BOM structure created manually

Drawings & BOM copied to CD's

E-mail/FTP/Snail mail to TACOM

Technician manually loads data into Windchill

Create product structure

Fill in metadata

Load drawings

Validate load

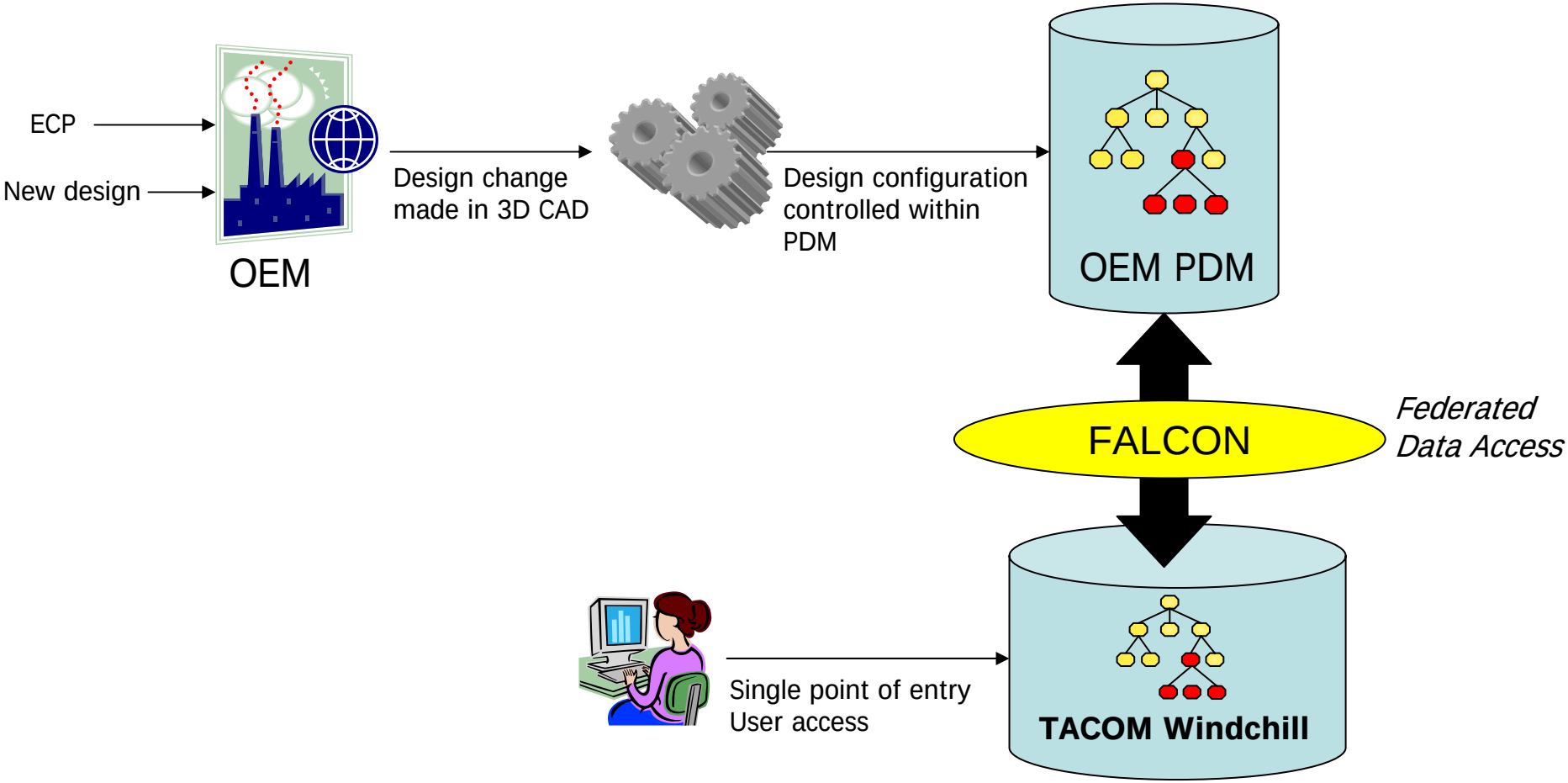
TACOM Windchill

Non-value add Functions + Loss of config. control

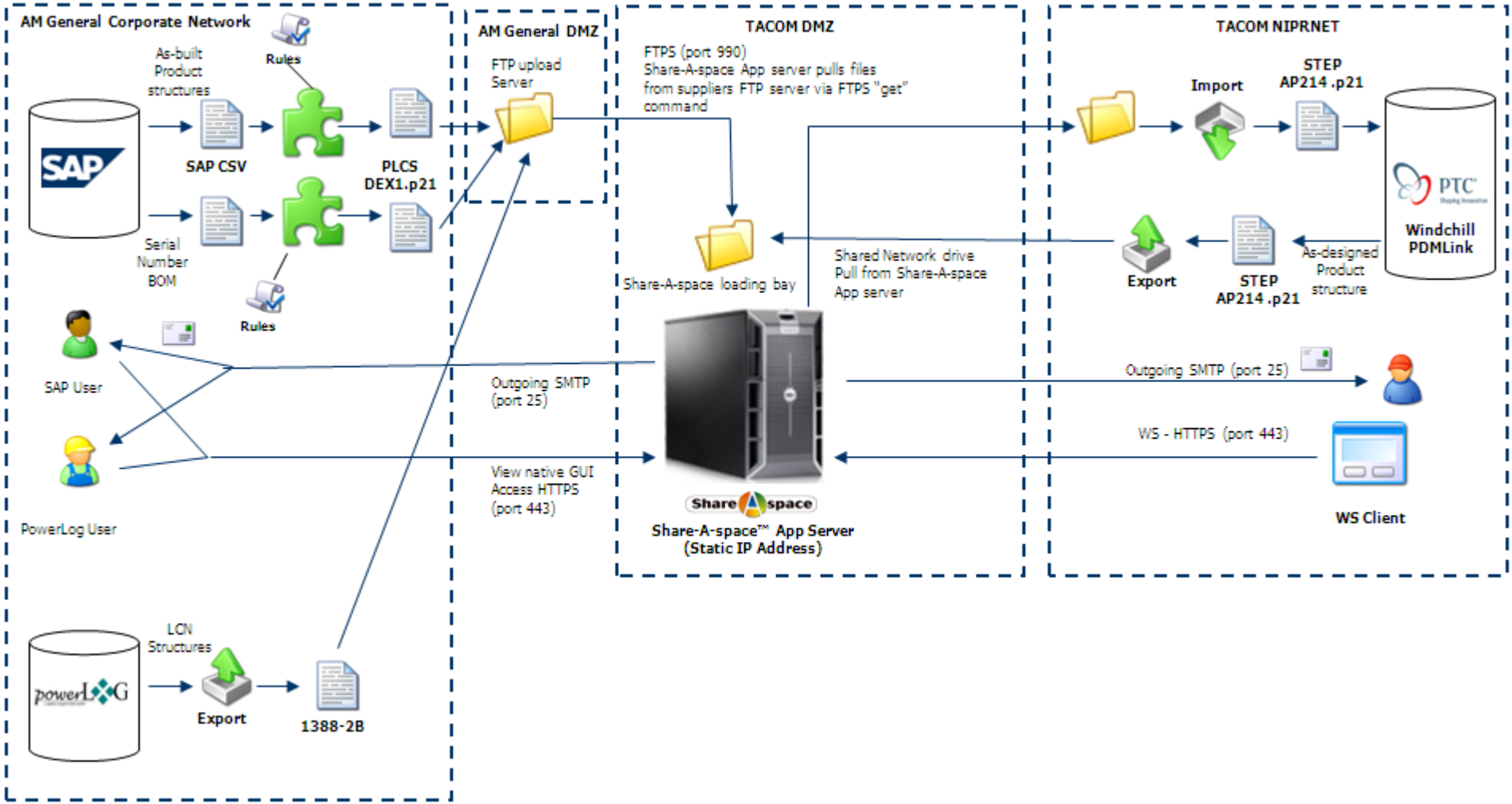
Drawings only – no 3D
Loss of config with OEM

Govt. initiated ECP

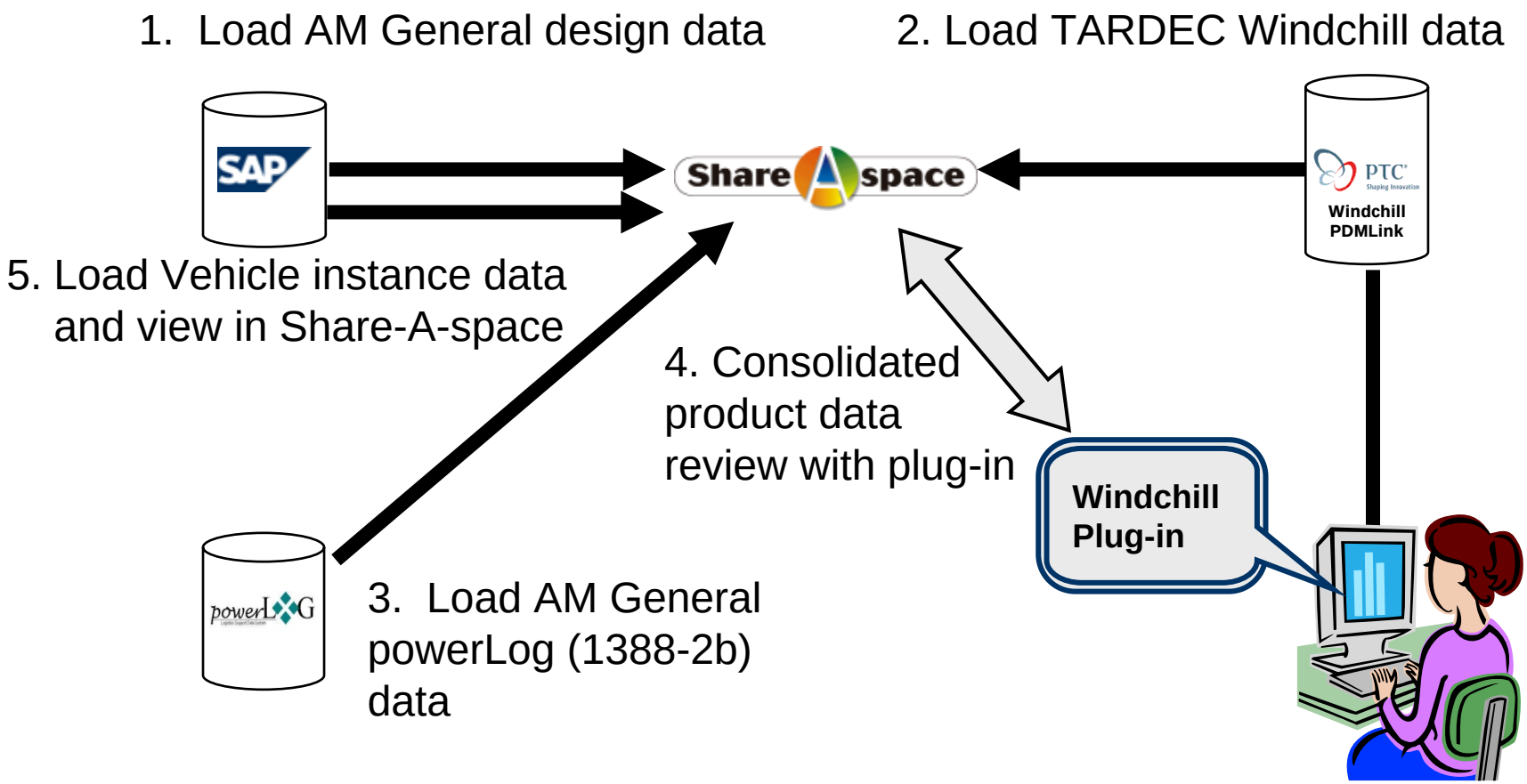
"To-be" Product Data Process



Humvee Pilot with AM General



Demonstration Process Overview

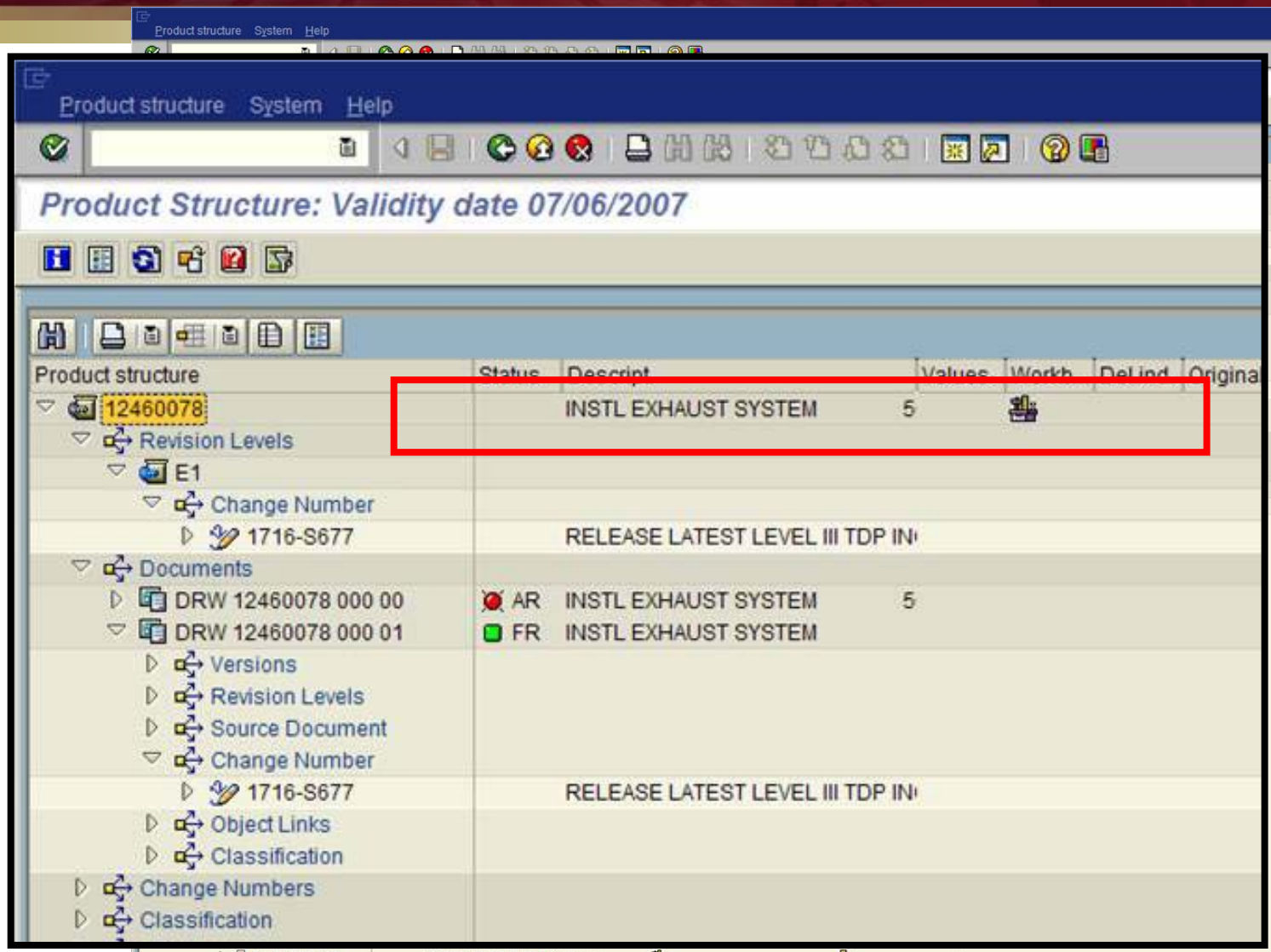


HMMWV Pilot – Demo Scenario

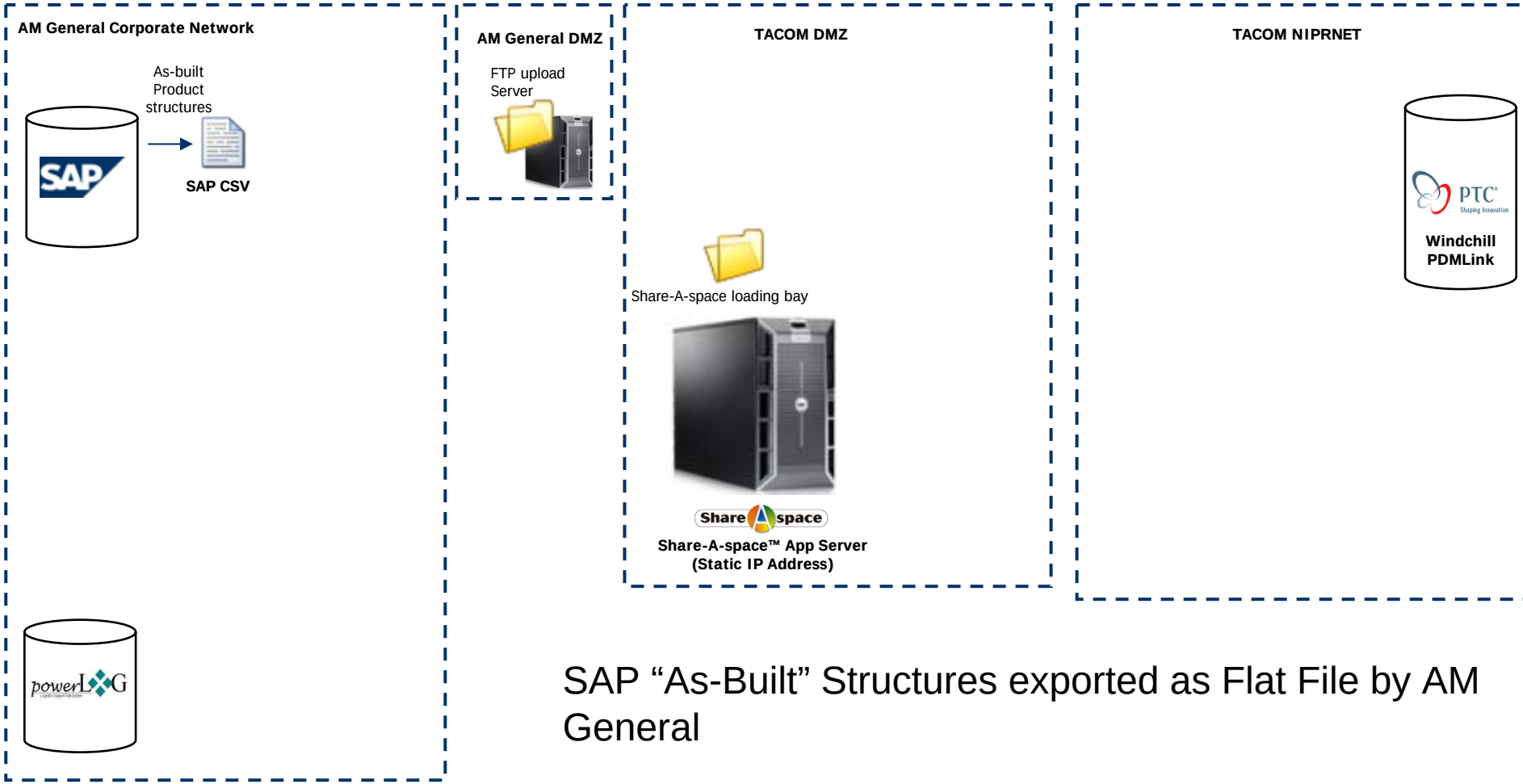
1. Initial Data Load – AM General SAP Data

- Extract “As Used To Manufacture” data from AM General’s SAP
- Map/transform SAP data to PLCS (ISO 10303-239)
- Load data into Share-A-space

As-manufactured Data stored in AM General SAP

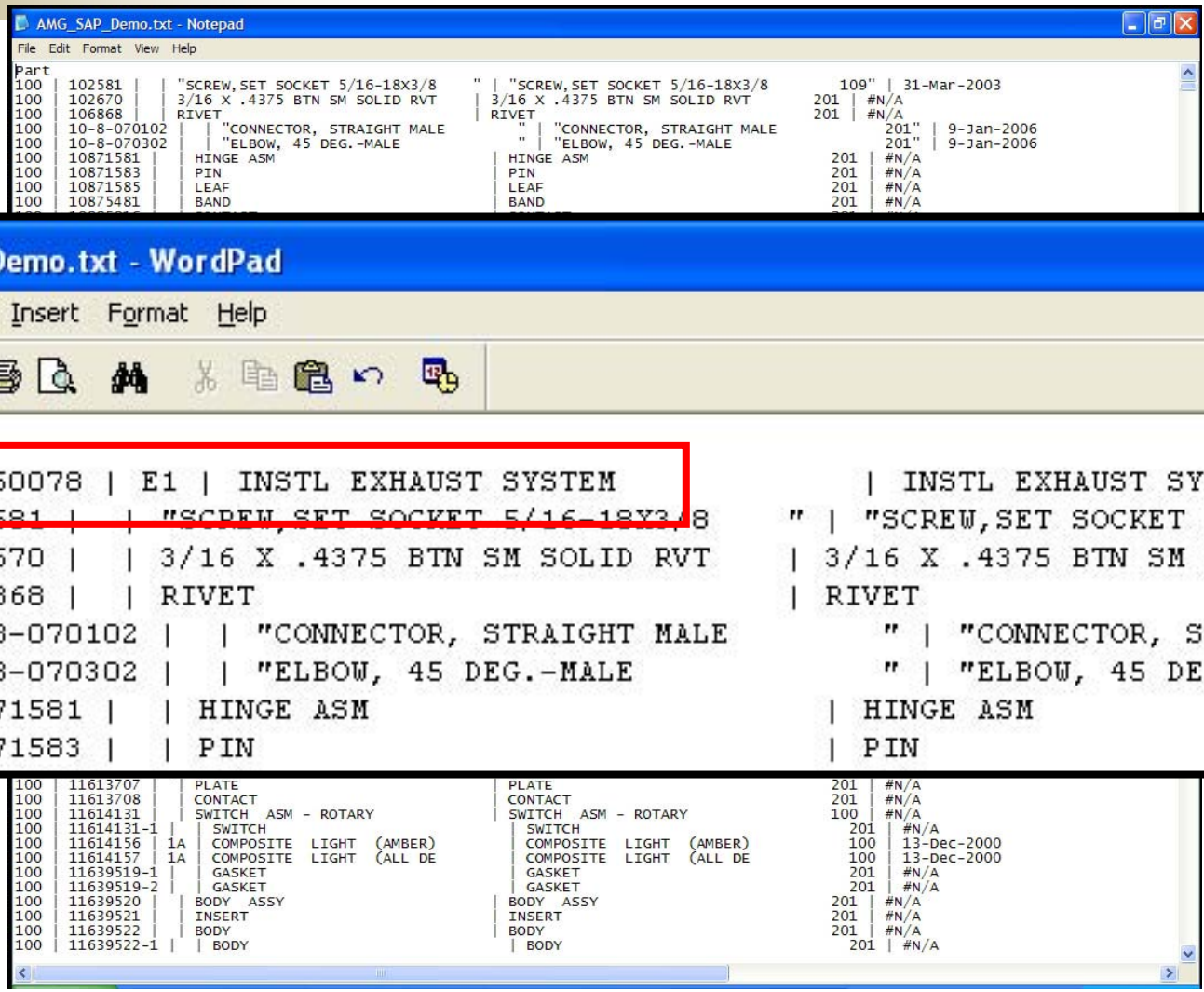


Initial Data Load – AMG SAP



SAP “As-Built” Structures exported as Flat File by AM General

SAP export


AMG_SAP_Demo.txt - Notepad
File Edit Format View Help
Part
100 | 102581 | | "SCREW,SET SOCKET 5/16-18X3/8 " | "SCREW,SET SOCKET 5/16-18X3/8 109" | 31-Mar-2003
100 | 102670 | | 3/16 X .4375 BTN SM SOLID RVT | 3/16 X .4375 BTN SM SOLID RVT 201 | #N/A
100 | 106868 | | RIVET | RIVET 201 | #N/A
100 | 10-8-070102 | | "CONNECTOR, STRAIGHT MALE " | "CONNECTOR, STRAIGHT MALE 201" | 9-Jan-2006
100 | 10-8-070302 | | "ELBOW, 45 DEG.-MALE " | "ELBOW, 45 DEG.-MALE 201" | 9-Jan-2006
100 | 10871581 | | HINGE ASM | HINGE ASM 201 | #N/A
100 | 10871583 | | PIN | PIN 201 | #N/A
100 | 10871585 | | LEAF | LEAF 201 | #N/A
100 | 10875481 | | BAND | BAND 201 | #N/A
AMG_SAP_Demo.txt - WordPad
File Edit View Insert Format Help
Part
100 | 12460078 | E1 | INSTL EXHAUST SYSTEM | INSTL EXHAUST SYSTEM
100 | 102581 | | "SCREW,SET SOCKET 5/16-18X3/8 " | "SCREW,SET SOCKET 5/16-18X3/8
100 | 102670 | | 3/16 X .4375 BTN SM SOLID RVT | 3/16 X .4375 BTN SM SOLID RVT
100 | 106868 | | RIVET | RIVET
100 | 10-8-070102 | | "CONNECTOR, STRAIGHT MALE " | "CONNECTOR, STRAIGHT MALE
100 | 10-8-070302 | | "ELBOW, 45 DEG.-MALE " | "ELBOW, 45 DEG.-MALE
100 | 10871581 | | HINGE ASM | HINGE ASM
100 | 10871583 | | PIN | PIN
100 | 11613707 | | PLATE | PLATE 201 | #N/A
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100 | 11614131-1 | | SWITCH | SWITCH 201 | #N/A
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100 | 11614157 | 1A | COMPOSITE LIGHT (ALL DE | COMPOSITE LIGHT (ALL DE 100 | 13-Dec-2000
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100 | 11639519-2 | | GASKET | GASKET 201 | #N/A
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100 | 11639521 | | INSERT | INSERT 201 | #N/A
100 | 11639522 | | BODY | BODY 201 | #N/A
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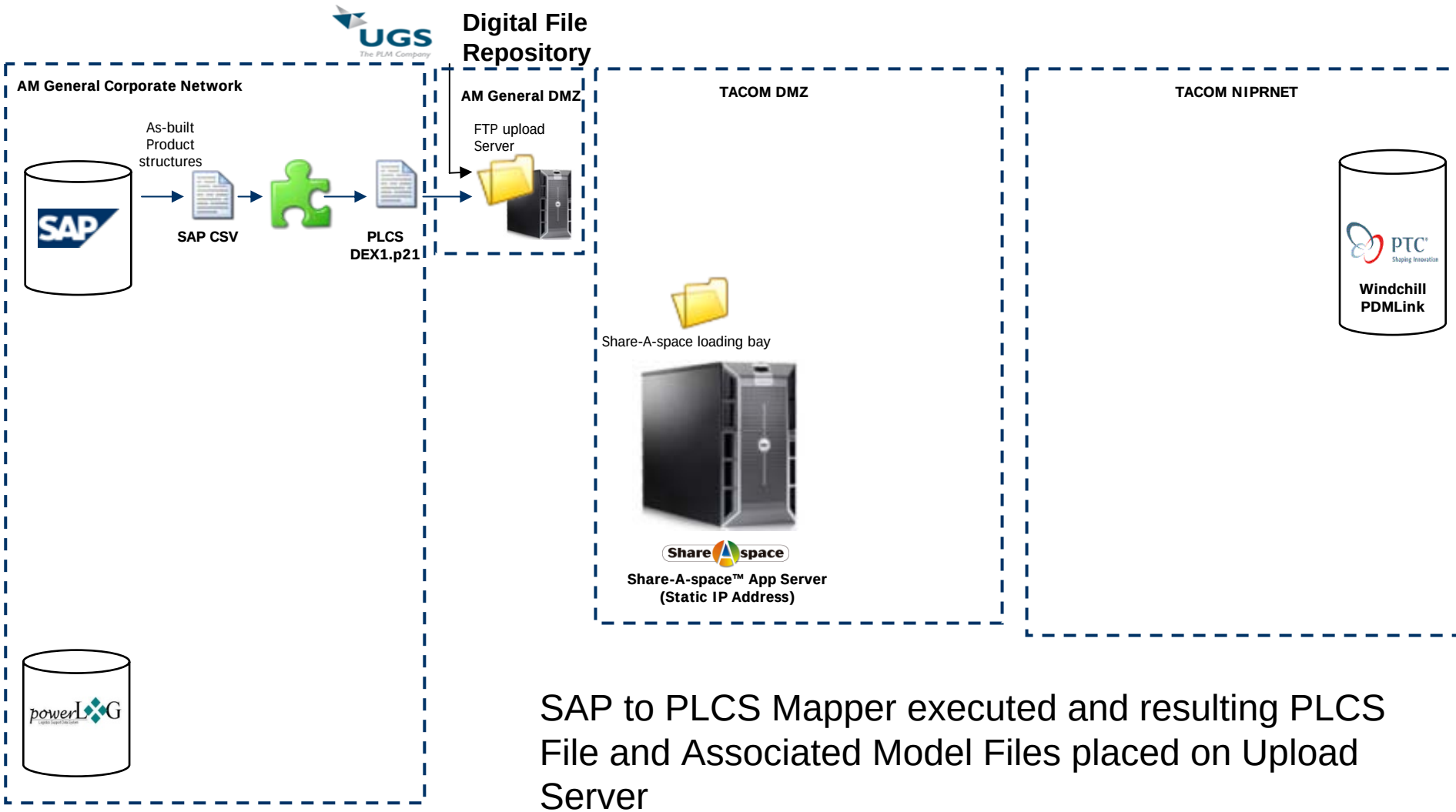
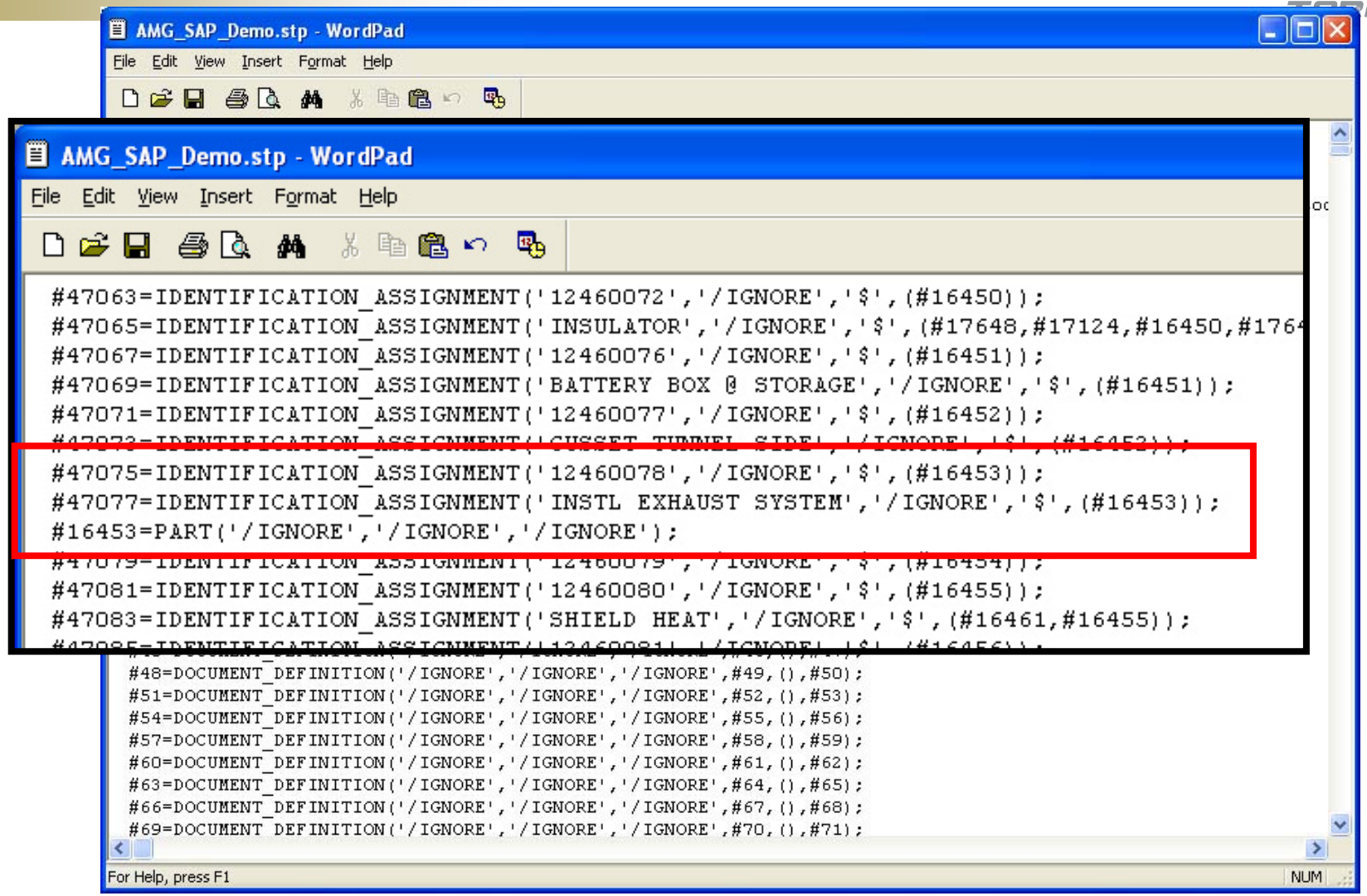
Initial Data Load – AMG SAP

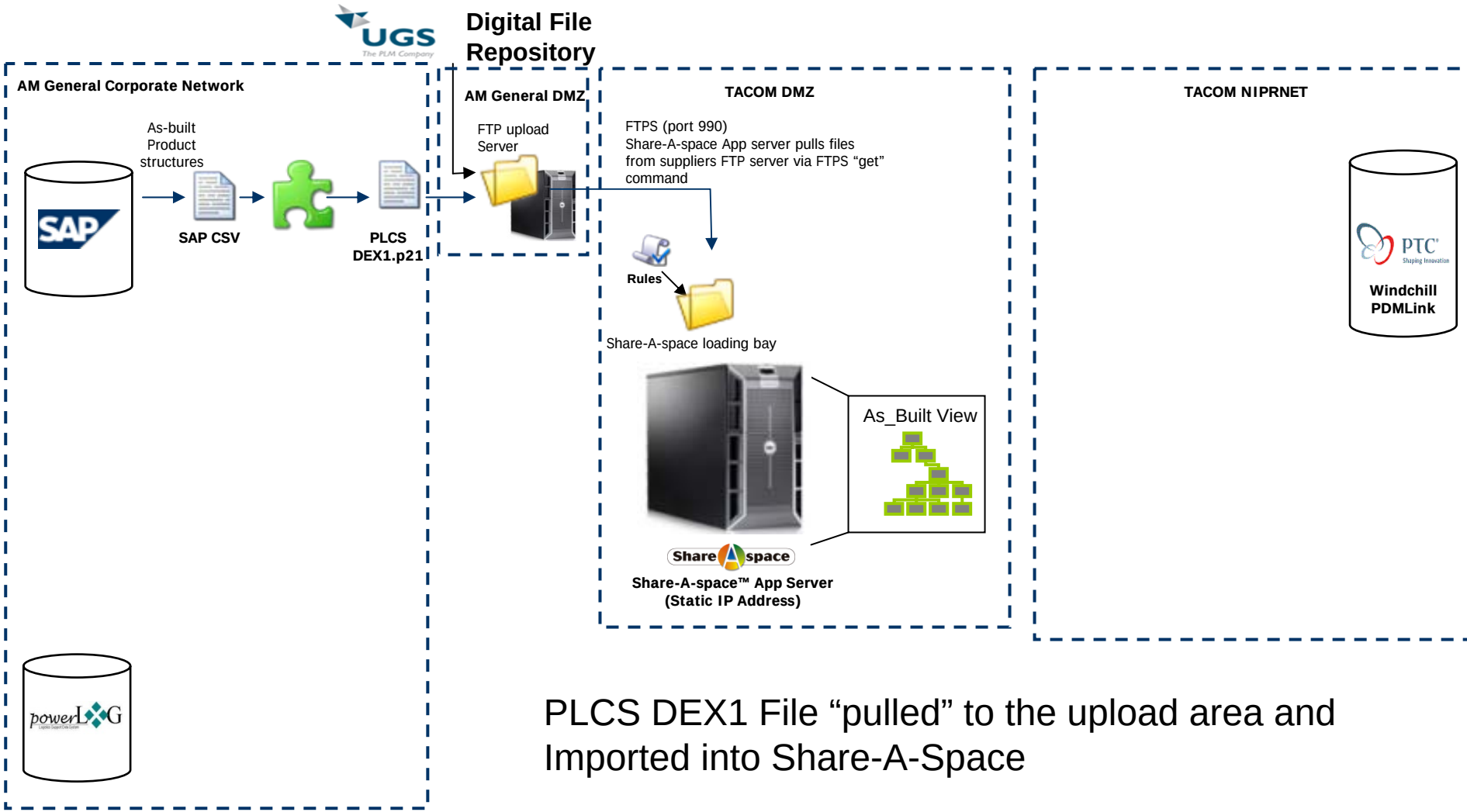


SAP to PLCS Mapper executed and resulting PLCS File and Associated Model Files placed on Upload Server

SAP data as PLCS

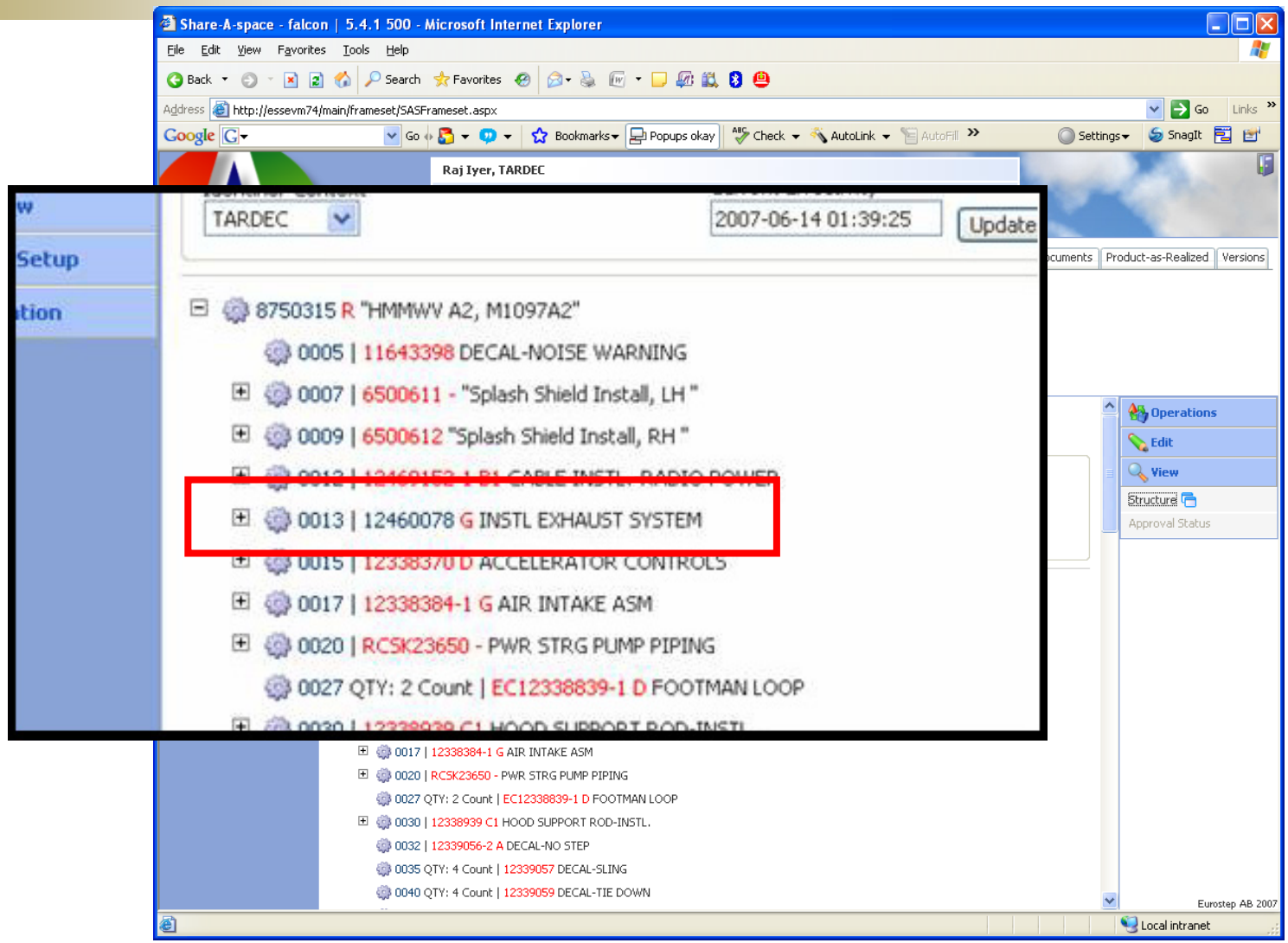


Initial Data Load – AMG SAP



PLCS DEX1 File "pulled" to the upload area and Imported into Share-A-Space

SAP data in Share-A-space

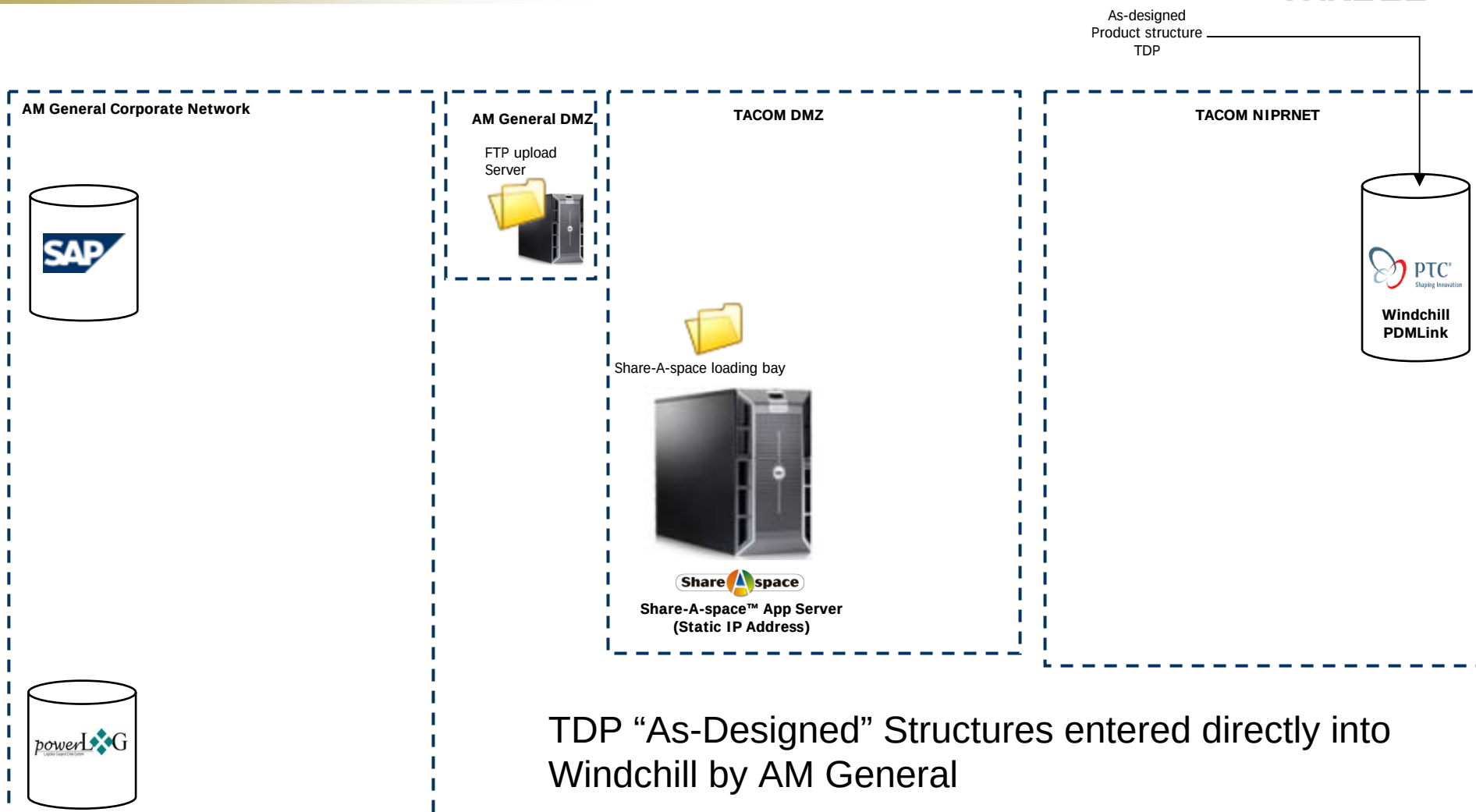


HMMWV Pilot – Demo Scenario

2. Initial Data Load – TARDEC Windchill Data

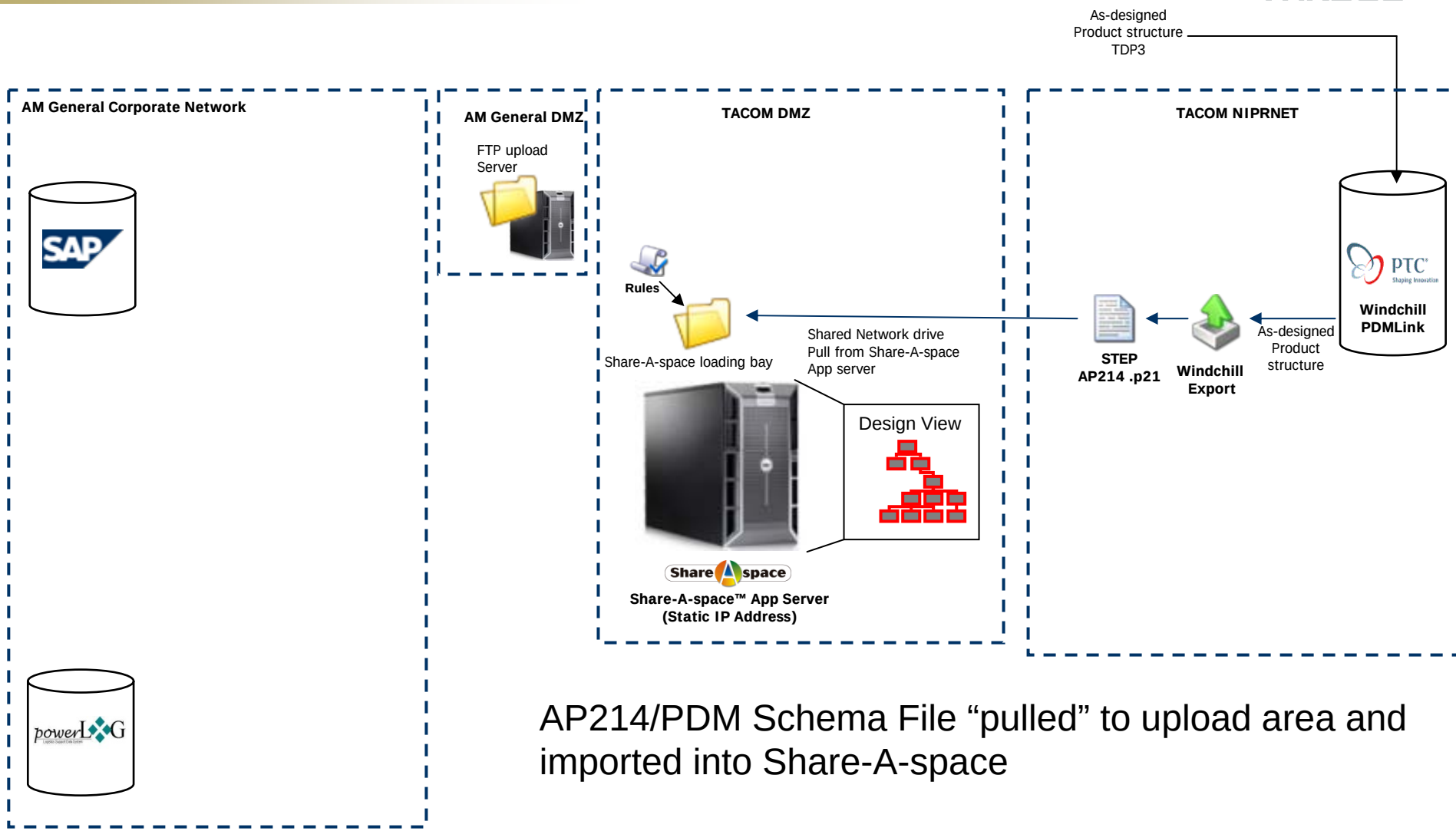
- Current content of TARDEC Windchill
- Extracted data from Windchill as STEP
- Loaded meta data into Share-A-space
  - Not supporting drawings/models
  - Used to enable comparison

Initial Data Load – TARDEC Windchill



TDP “As-Designed” Structures entered directly into Windchill by AM General

Initial Data Load – TARDEC Windchill



AP214/PDM Schema File “pulled” to upload area and imported into Share-A-space

Windchill Data in PDM Schema format

STEP_EXP_2007-5-12_10-2-47.stp - Notepad

File Edit Format View Help

ISO-10303-21;

STEP_EXP_2007-5-12_10-2-47.stp - WordPad

File Edit View Insert Format Help

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ISO-10303-21;
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FILE_NAME('C:\\ptc\\Windchill_8.0\\temp\\1181685770875_step\\STEP_EXP_2007-5-12_10-2-47.stp',
'2007-06-12T17:03:07',('author'),('Parametric Technology','Tech Marketing','Berlin','GE',
'11111'),'1.0','Windchill STEP Import/Export','ER');
FILE_SCHEMA(('PDM_SCHEMA'));
ENDSEC;

DATA;
#22= PRODUCT('12460078','EXHAUST SYSTEM INSTALLATION','EXHAUST SYSTEM INSTALLATION',(#3));
#1= APPLICATION_CONTEXT('mechanical design');
#3= PRODUCT_CONTEXT('',#1,'');
#4= APPLICATION_PROTOCOL_DEFINITION('version 1.1','pdm_schema',1998,#1);
#5= PRODUCT_RELATED_PRODUCT_CATEGORY('part',$,(#22,#24,#26,#28,#30,#32,
#34,#36,#38,#40,#42,#44,#46,#48,#50,#52,#54,#56,#58,#60,#62,#64,#66,#68,
#70,#72,#74,#76,#78,#80,#82,#84,#86,#88,#90,#92,#94,#96,#98,#100,#102,
#104,#106,#108,#110,#112,#114,#116,#118,#120,#122,#124,#126,#128,#130,
#132,#134,#136,#138,#140,#142,#144,#146));
#1574= PRODUCT_RELATED_PRODUCT_CATEGORY('Cage Code','24617',(#74));
#7= PRODUCT_DEFINITION_CONTEXT('part definition',#1,'design');
```

```
#40= PRODUCT('B1821BH038C200N','Screw,Cap,Hexagon Head',
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#42= PRODUCT('9416918','NUT','NUT',(#3));
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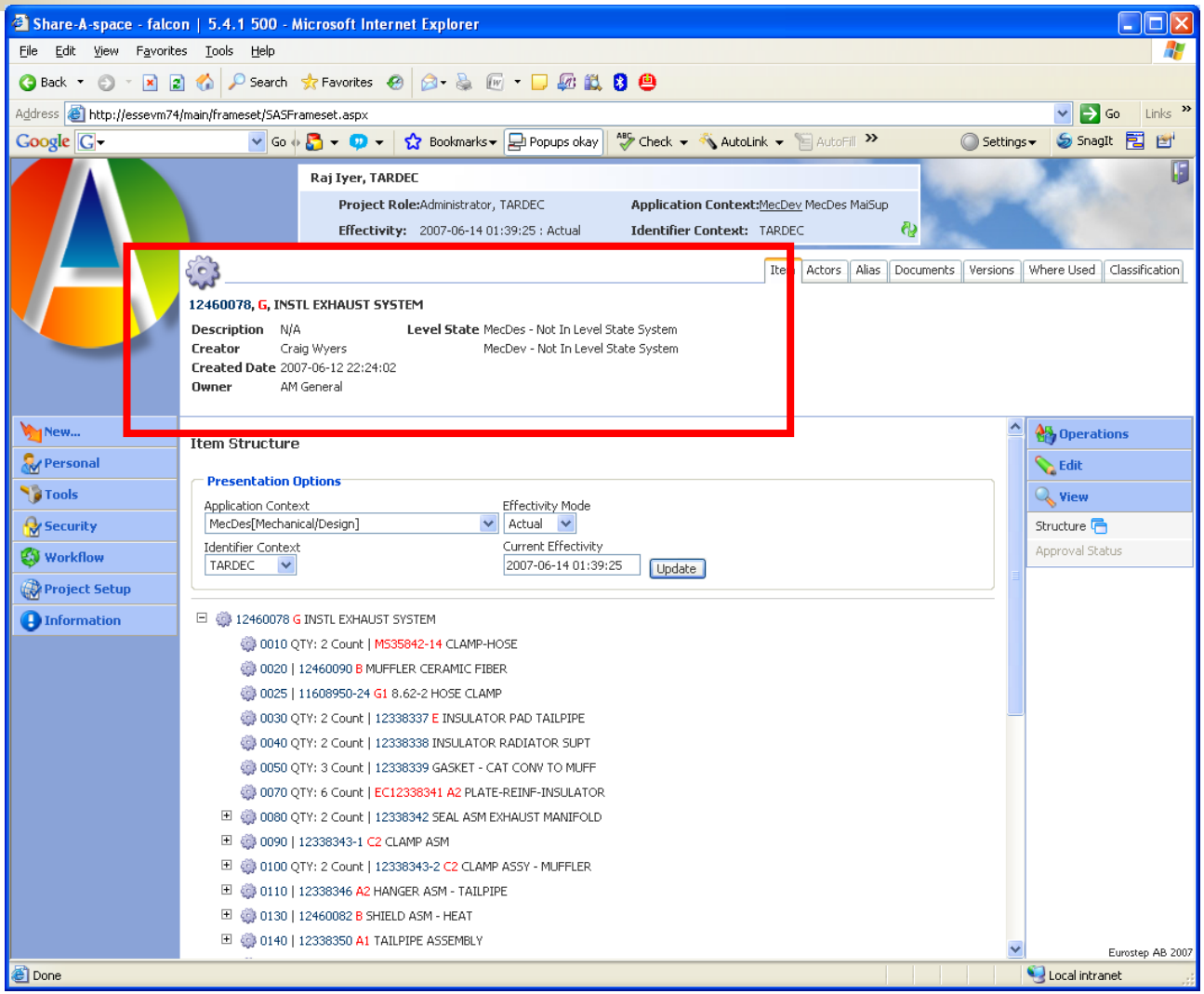
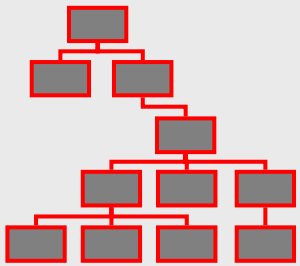
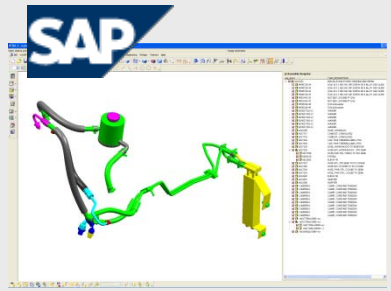
Windchill data in Share-A-space



What's happened so far:
Configuration Integration: SAP, WC => Share-A-space



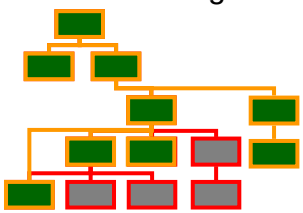


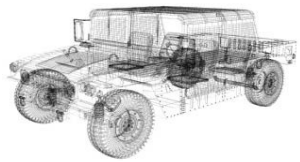
AM General

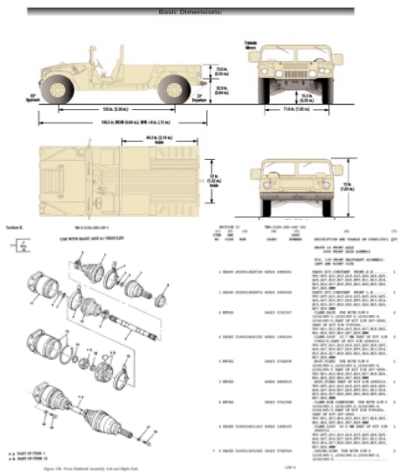
"As Used To Manufacture" Version Release

Share A space

"As Used to Manufacture" View + As Designed View



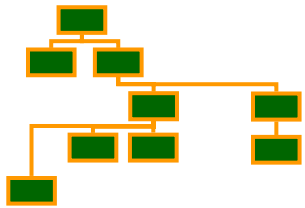




TARDEC

PTC Shaping Innovation

As Designed View



Data load results

- Complete As-Manufactured data set loaded from AM General SAP to Share-A-space
  - 3030 parts plus example CAD models and drawings
- Partial data set loaded from TARDEC's Windchill system for demo
  - Exhaust sub system comprising 63 Parts

HMMWV Pilot – Demo Scenario

3. Initial Data Load – AM General powerLog Data

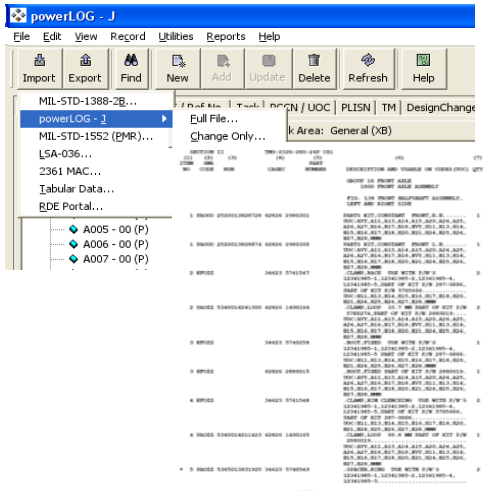
LSA data background

- Mil Std 1388 covers a broad scope of logistic support analysis (LSA) including failure modes, task analysis and spare-parts
  - This analysis is usually undertaken as part of designing the support system for a product
- AM General use a report generated from Mil Std 1388 data to supply provisioning list data to the Army
  - The data and report are created using the powerLog system
    - powerLog is the reference Mil Std 1388 implementation produced by LOGSA
- The data provided by AM General covers a limited subset of Mil Std 1388:
  - A breakdown of the end-item using Logistic Control Numbers (LCNs) to identify relevant positions
    - The data here is a physical breakdown (cf. functional) that corresponds to an assembly structure
  - Links from that breakdown to the corresponding parts
- As much more of Mil Std 1388 is relevant to PLCS it was decided to work with the data as held by powerLog rather than the output report
  - The reduced scope allowed use of existing PLCS DEX capabilities
    - Coverage of the full scope of Mil Std 1388 by PLCS DEXs is not yet in place

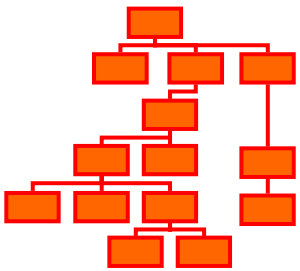
AM General powerLog -> PLCS MDI

powerLOG
Logistics Support Data System

LSAR

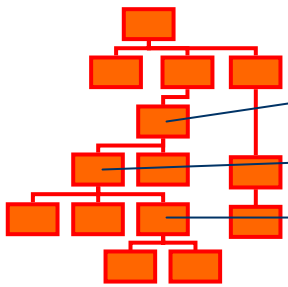


LCN Breakdown

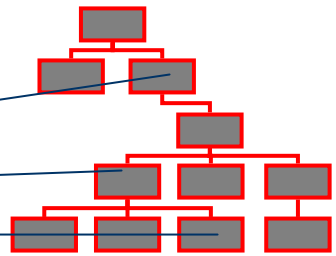


ShareAspace

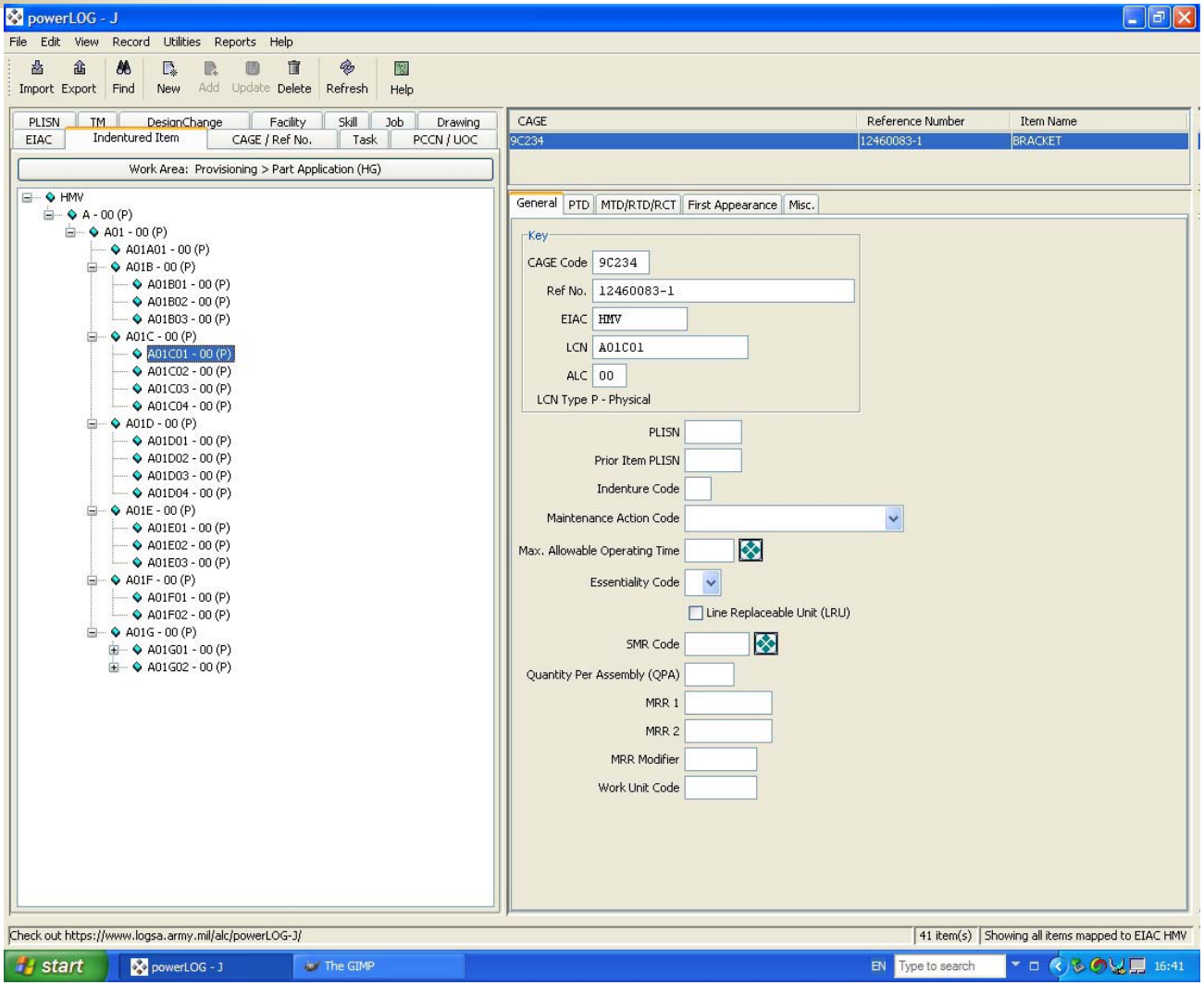
LCN Breakdown



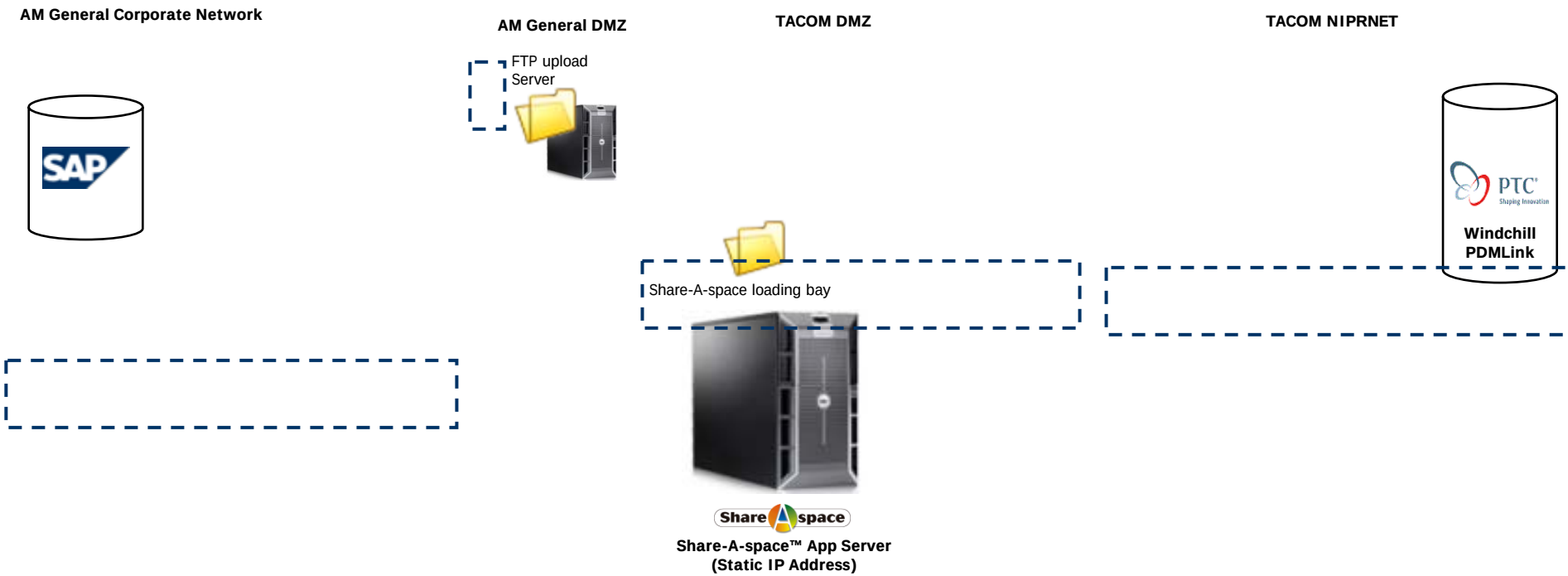
Design View

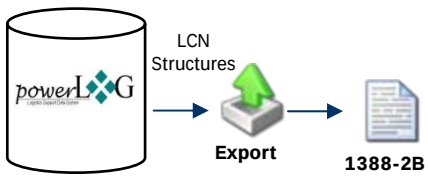


Screenshot from powerLog-J



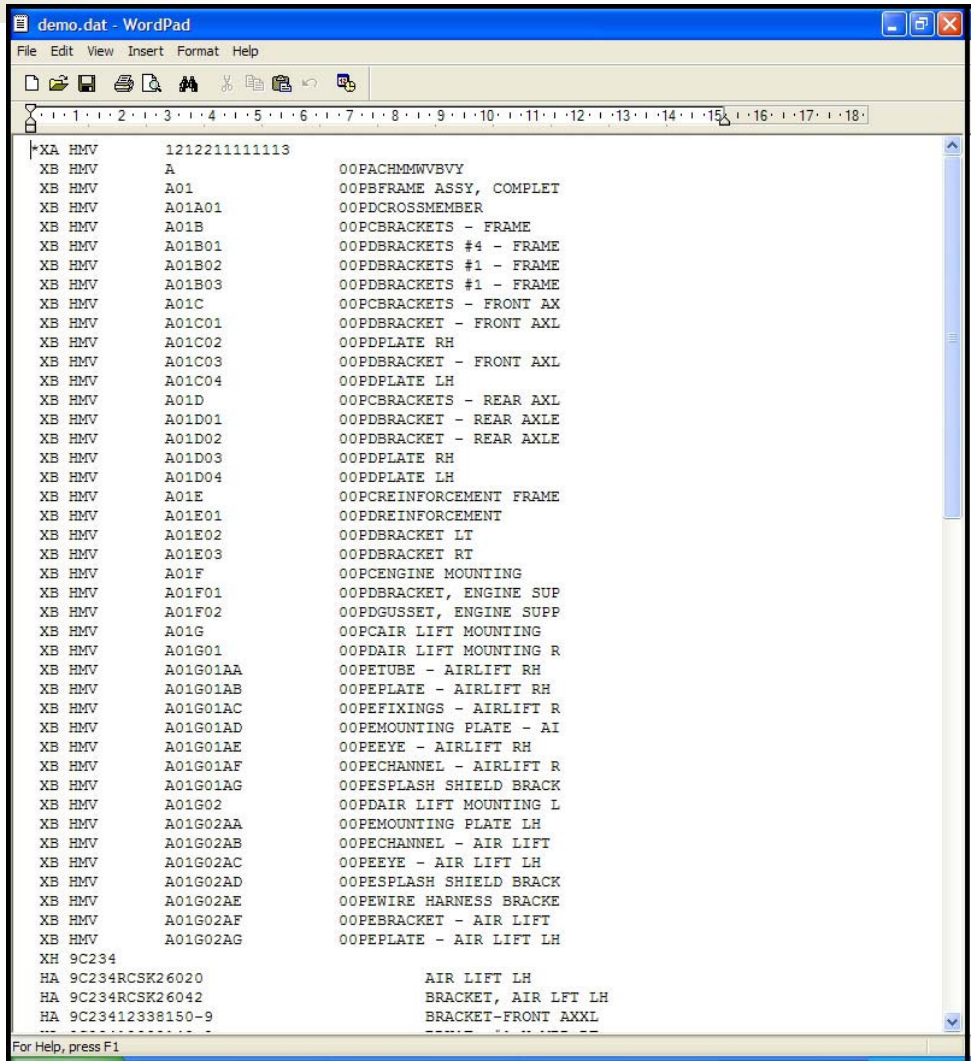
Initial Data Load – AM General powerLog-J



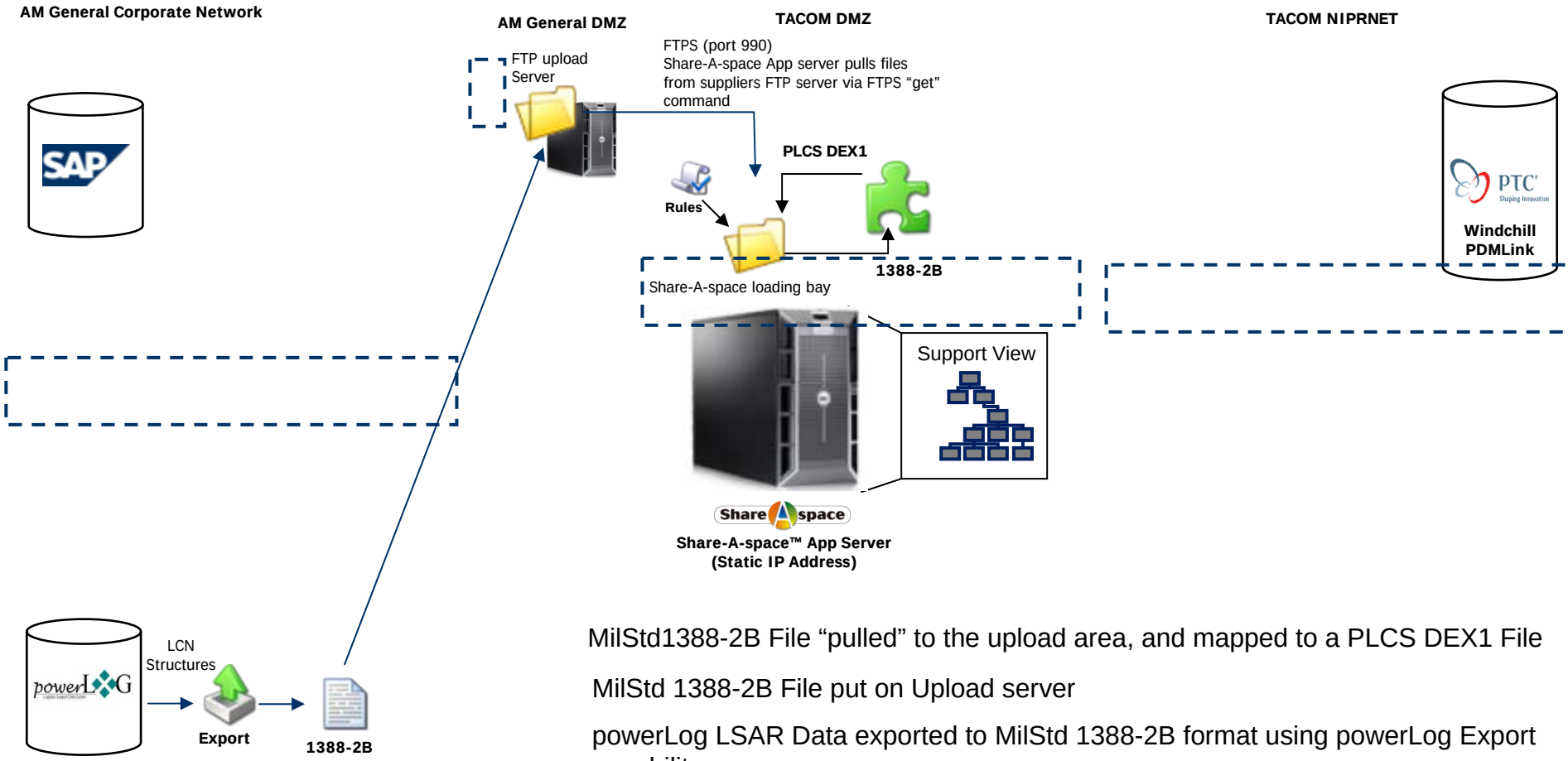


powerLog LSAR Data exported to MilStd 1388-2B format using powerLog Export capability

LSA data exported as 1388-2B format



Initial Data Load – AM General powerLog-J



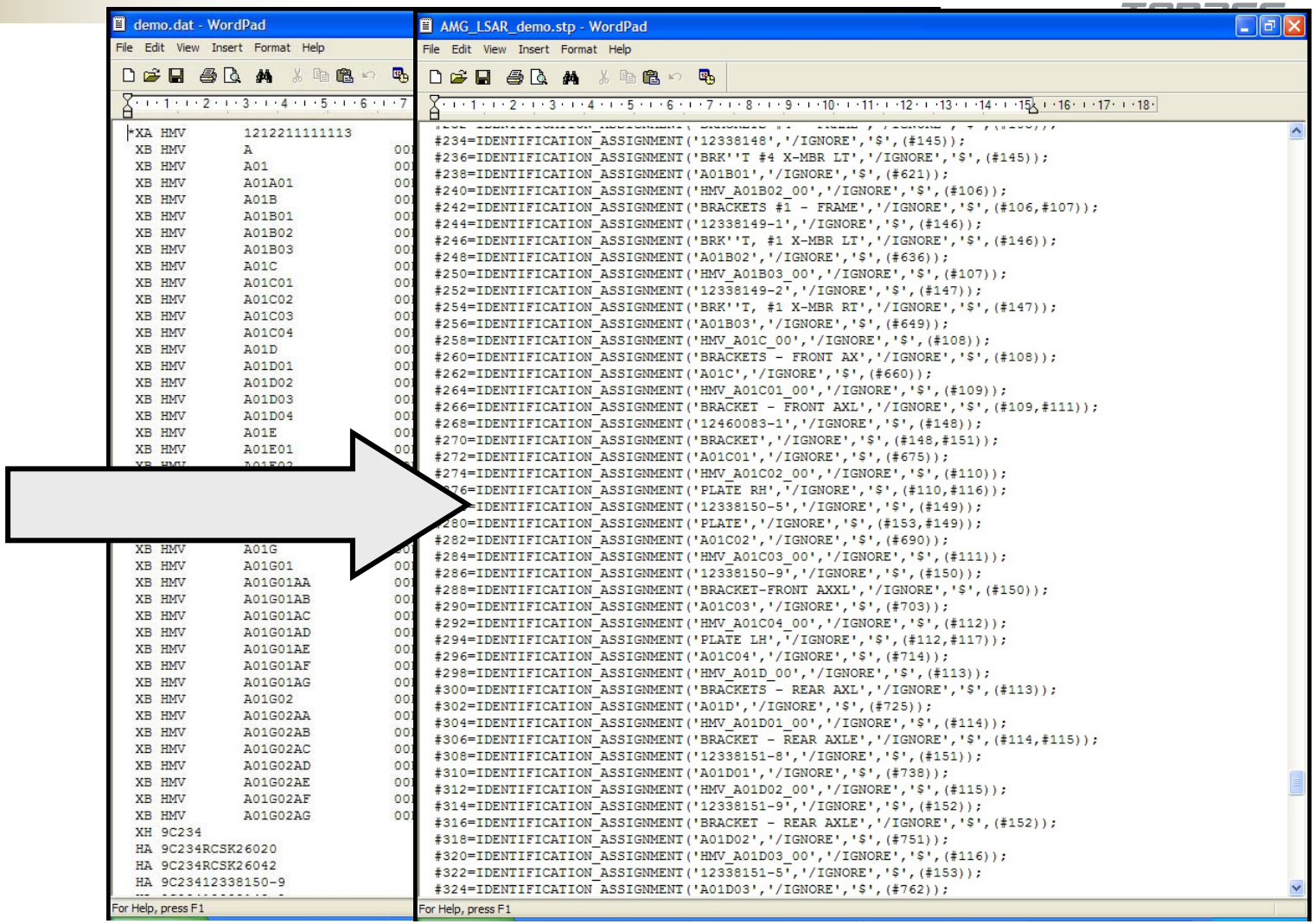
MilStd1388-2B File "pulled" to the upload area, and mapped to a PLCS DEX1 File

MilStd 1388-2B File put on Upload server

powerLog LSAR Data exported to MilStd 1388-2B format using powerLog Export capability

PLCS DEX1 File imported into Share-A-space and connected to the "As_Designed" structure

1388-2B export mapped to PLCS



demo.dat - WordPad

File Edit View Insert Format Help

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 XB HMV        A                00
 XB HMV        A01              00
 XB HMV        A01A01           00
 XB HMV        A01B             00
 XB HMV        A01B01           00
 XB HMV        A01B02           00
 XB HMV        A01B03           00
 XB HMV        A01C             00
 XB HMV        A01C01           00
 XB HMV        A01C02           00
 XB HMV        A01C03           00
 XB HMV        A01C04           00
 XB HMV        A01D             00
 XB HMV        A01D01           00
 XB HMV        A01D02           00
 XB HMV        A01D03           00
 XB HMV        A01D04           00
 XB HMV        A01E             00
 XB HMV        A01E01           00
 XB HMV        A01G             00
 XB HMV        A01G01           00
 XB HMV        A01G01AA         00
 XB HMV        A01G01AB         00
 XB HMV        A01G01AC         00
 XB HMV        A01G01AD         00
 XB HMV        A01G01AE         00
 XB HMV        A01G01AF         00
 XB HMV        A01G01AG         00
 XB HMV        A01G02           00
 XB HMV        A01G02AA         00
 XB HMV        A01G02AB         00
 XB HMV        A01G02AC         00
 XB HMV        A01G02AD         00
 XB HMV        A01G02AE         00
 XB HMV        A01G02AF         00
 XB HMV        A01G02AG         00
 XH 9C234
 HA 9C234RCSK26020
 HA 9C234RCSK26042
 HA 9C23412338150-9
```

For Help, press F1

AMG_LSAR_demo.stp - WordPad

File Edit View Insert Format Help

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#234=IDENTIFICATION_ASSIGNMENT('12338148','/IGNORE','$',(#145));
#236=IDENTIFICATION_ASSIGNMENT('BRK''T #4 X-MBR LT','/IGNORE','$',(#145));
#238=IDENTIFICATION_ASSIGNMENT('A01B01','/IGNORE','$',(#621));
#240=IDENTIFICATION_ASSIGNMENT('HMV_A01B02_00','/IGNORE','$',(#106));
#242=IDENTIFICATION_ASSIGNMENT('BRACKETS #1 - FRAME','/IGNORE','$',(#106,#107));
#244=IDENTIFICATION_ASSIGNMENT('12338149-1','/IGNORE','$',(#146));
#246=IDENTIFICATION_ASSIGNMENT('BRK''T, #1 X-MBR LT','/IGNORE','$',(#146));
#248=IDENTIFICATION_ASSIGNMENT('A01B02','/IGNORE','$',(#636));
#250=IDENTIFICATION_ASSIGNMENT('HMV_A01B03_00','/IGNORE','$',(#107));
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#254=IDENTIFICATION_ASSIGNMENT('BRK''T, #1 X-MBR RT','/IGNORE','$',(#147));
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#258=IDENTIFICATION_ASSIGNMENT('HMV_A01C_00','/IGNORE','$',(#108));
#260=IDENTIFICATION_ASSIGNMENT('BRACKETS - FRONT AX','/IGNORE','$',(#108));
#262=IDENTIFICATION_ASSIGNMENT('A01C','/IGNORE','$',(#660));
#264=IDENTIFICATION_ASSIGNMENT('HMV_A01C01_00','/IGNORE','$',(#109));
#266=IDENTIFICATION_ASSIGNMENT('BRACKET - FRONT AXL','/IGNORE','$',(#109,#111));
#268=IDENTIFICATION_ASSIGNMENT('12460083-1','/IGNORE','$',(#148));
#270=IDENTIFICATION_ASSIGNMENT('BRACKET','/IGNORE','$',(#148,#151));
#272=IDENTIFICATION_ASSIGNMENT('A01C01','/IGNORE','$',(#675));
#274=IDENTIFICATION_ASSIGNMENT('HMV_A01C02_00','/IGNORE','$',(#110));
#276=IDENTIFICATION_ASSIGNMENT('PLATE RH','/IGNORE','$',(#110,#116));
#278=IDENTIFICATION_ASSIGNMENT('12338150-5','/IGNORE','$',(#149));
#280=IDENTIFICATION_ASSIGNMENT('PLATE','/IGNORE','$',(#153,#149));
#282=IDENTIFICATION_ASSIGNMENT('A01C02','/IGNORE','$',(#690));
#284=IDENTIFICATION_ASSIGNMENT('HMV_A01C03_00','/IGNORE','$',(#111));
#286=IDENTIFICATION_ASSIGNMENT('12338150-9','/IGNORE','$',(#150));
#288=IDENTIFICATION_ASSIGNMENT('BRACKET-FRONT AXXL','/IGNORE','$',(#150));
#290=IDENTIFICATION_ASSIGNMENT('A01C03','/IGNORE','$',(#703));
#292=IDENTIFICATION_ASSIGNMENT('HMV_A01C04_00','/IGNORE','$',(#112));
#294=IDENTIFICATION_ASSIGNMENT('PLATE LH','/IGNORE','$',(#112,#117));
#296=IDENTIFICATION_ASSIGNMENT('A01C04','/IGNORE','$',(#714));
#298=IDENTIFICATION_ASSIGNMENT('HMV_A01D_00','/IGNORE','$',(#113));
#300=IDENTIFICATION_ASSIGNMENT('BRACKETS - REAR AXL','/IGNORE','$',(#113));
#302=IDENTIFICATION_ASSIGNMENT('A01D','/IGNORE','$',(#725));
#304=IDENTIFICATION_ASSIGNMENT('HMV_A01D01_00','/IGNORE','$',(#114));
#306=IDENTIFICATION_ASSIGNMENT('BRACKET - REAR AXLE','/IGNORE','$',(#114,#115));
#308=IDENTIFICATION_ASSIGNMENT('12338151-8','/IGNORE','$',(#151));
#310=IDENTIFICATION_ASSIGNMENT('A01D01','/IGNORE','$',(#738));
#312=IDENTIFICATION_ASSIGNMENT('HMV_A01D02_00','/IGNORE','$',(#115));
#314=IDENTIFICATION_ASSIGNMENT('12338151-9','/IGNORE','$',(#152));
#316=IDENTIFICATION_ASSIGNMENT('BRACKET - REAR AXLE','/IGNORE','$',(#152));
#318=IDENTIFICATION_ASSIGNMENT('A01D02','/IGNORE','$',(#751));
#320=IDENTIFICATION_ASSIGNMENT('HMV_A01D03_00','/IGNORE','$',(#116));
#322=IDENTIFICATION_ASSIGNMENT('12338151-5','/IGNORE','$',(#153));
#324=IDENTIFICATION_ASSIGNMENT('A01D03','/IGNORE','$',(#762));
```
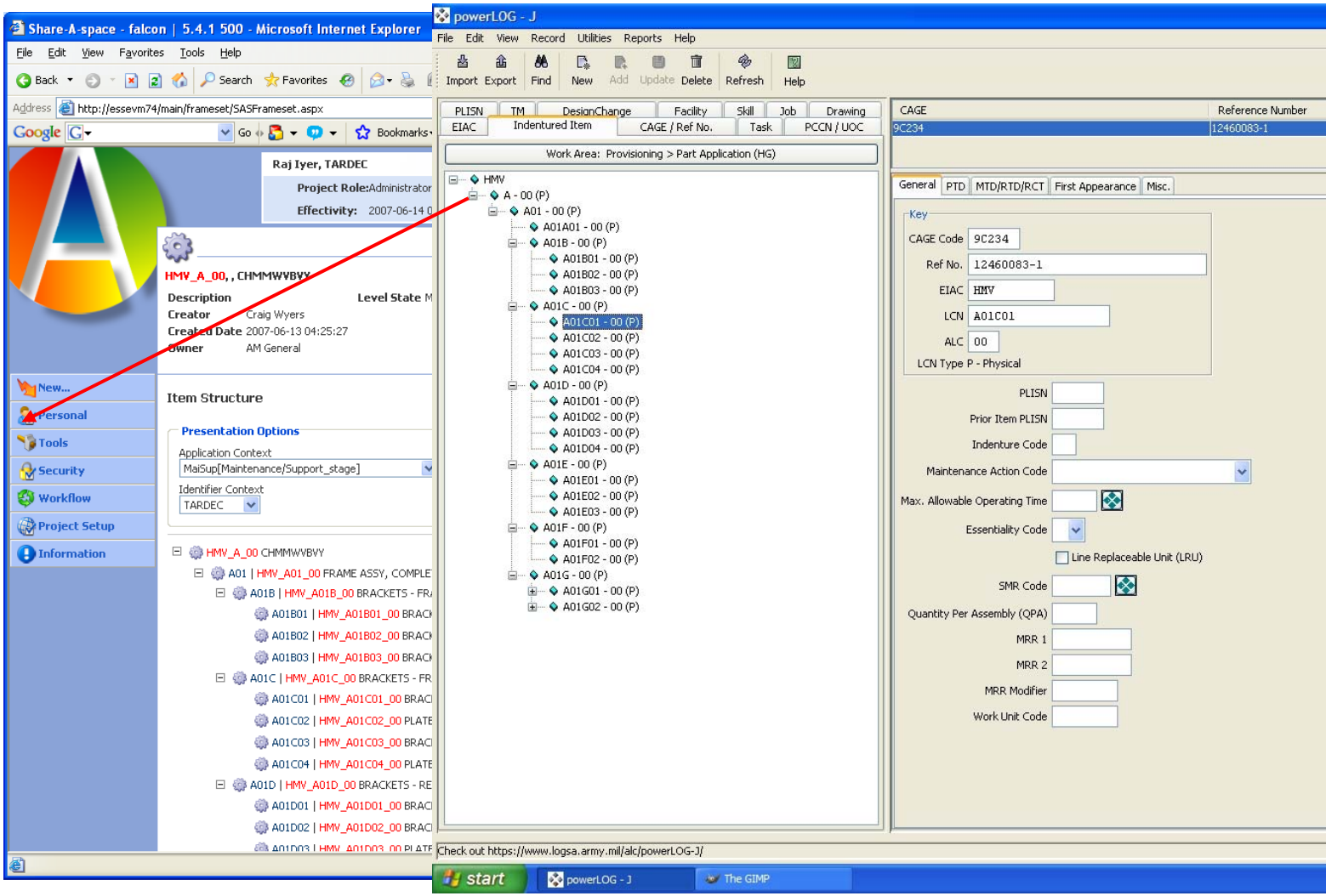

For Help, press F1

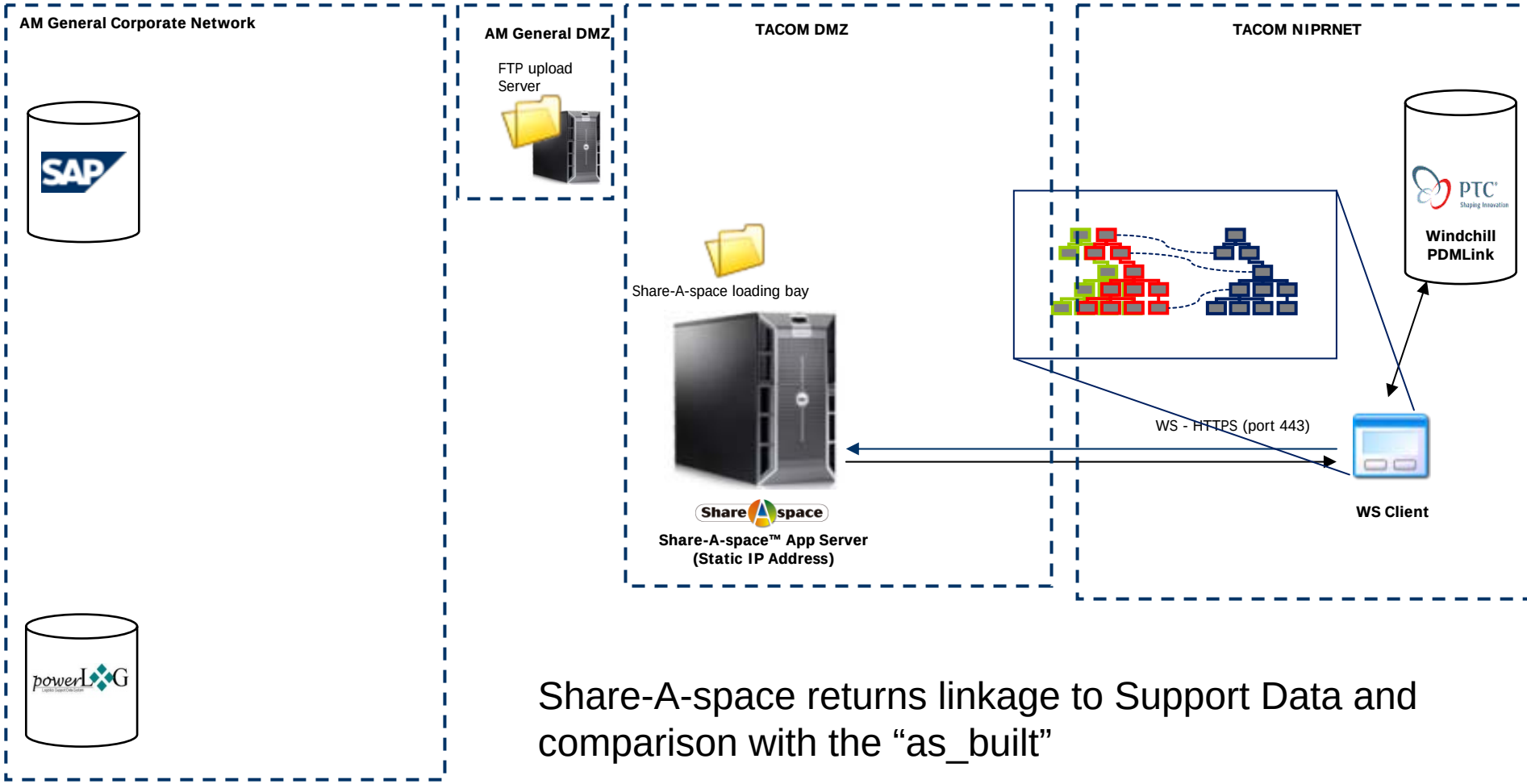
powerLog data in Share-A-space



HMMWV Pilot – Demo Scenario

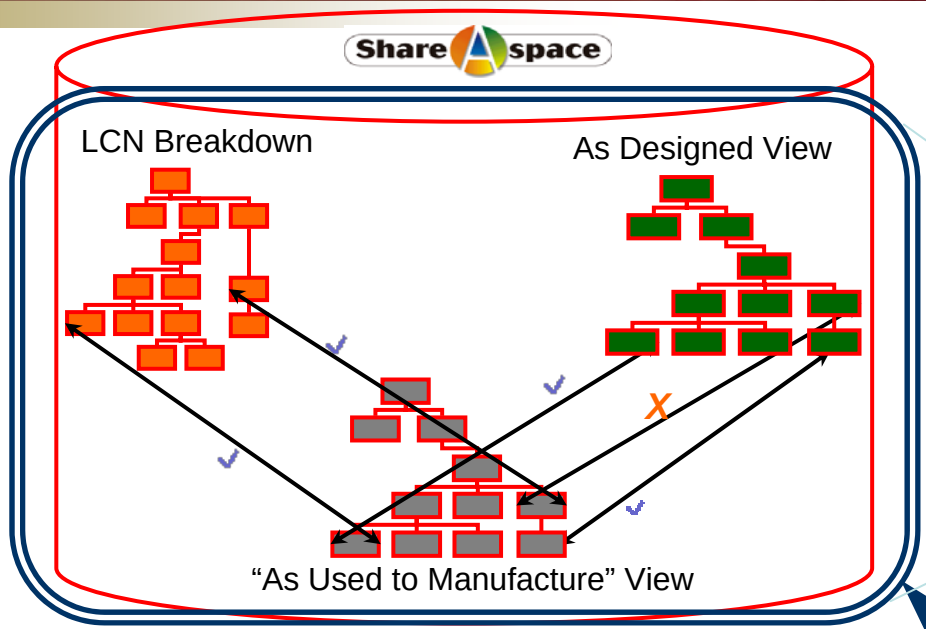
4. Consolidated Product Data Review with Windchill Plug-in

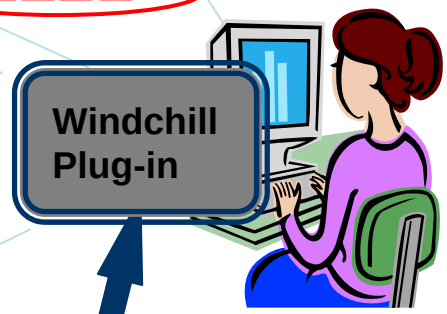
Windchill Plug-in Browser



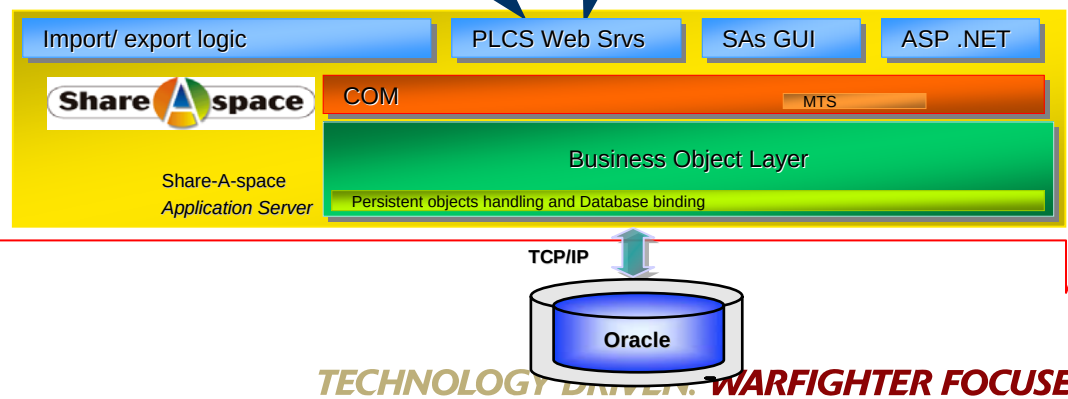
Share-A-space returns linkage to Support Data and comparison with the “as_built”

Plug-in Structure Browser





PLCS Master Data Integrator

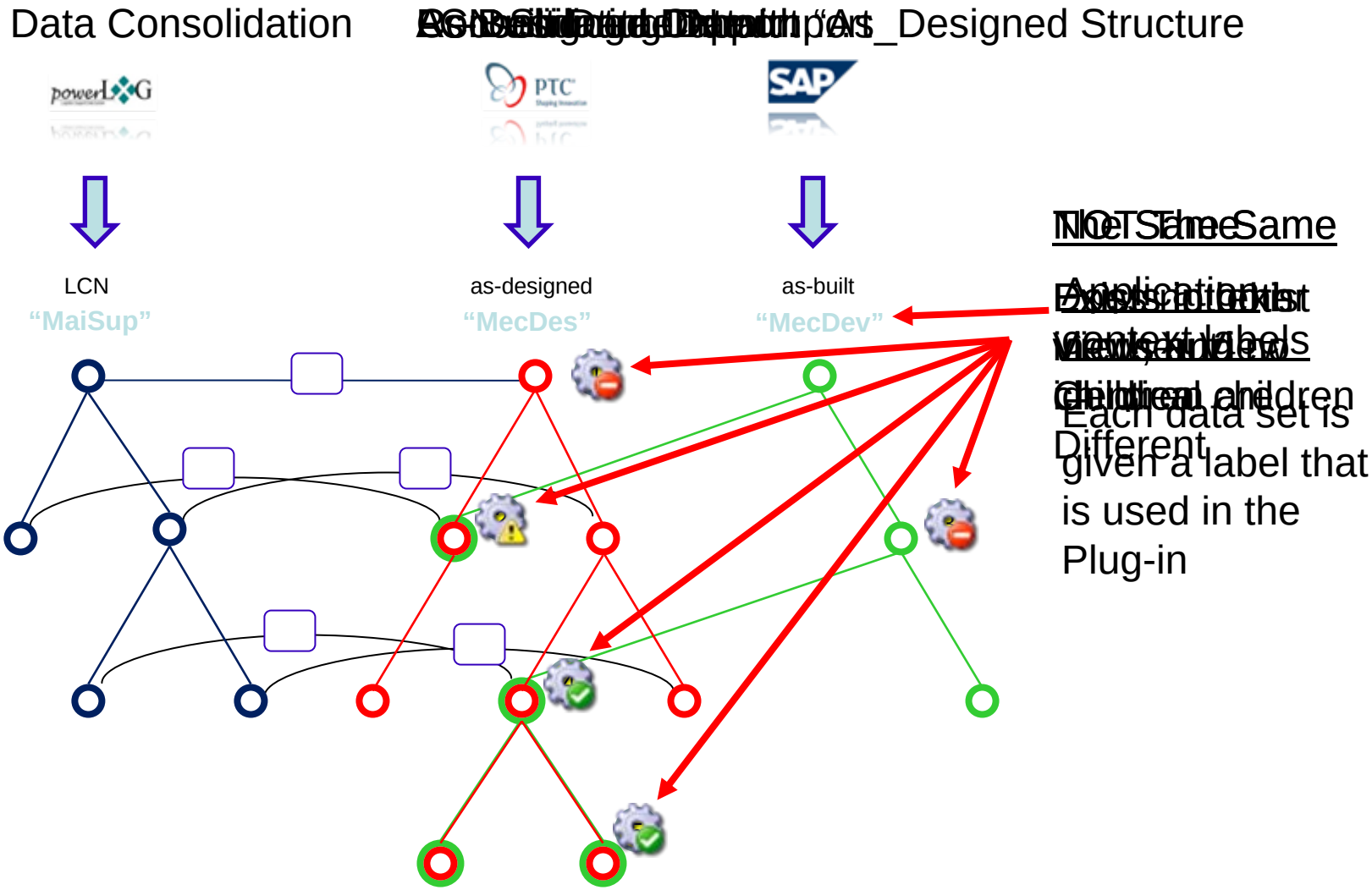


As-designed versus As-manufactured

- As-Designed data for the exhaust system comes from TARDEC's Windchill
- As-Manufactured data for the entire M1097-A2 comes from AM General's SAP system
- (Plus the LSA data from powerLog)
- Both sets of data are now available to navigate and view
  - Via the Share-A-space interface
  - Via a plug-in to Windchill
- Can now look at consistency between As-Manufactured and As-Designed structures
  - The following slide shows how differences in the structures are presented by use of icons

Visual representation of data consolidation

Data Consolidation

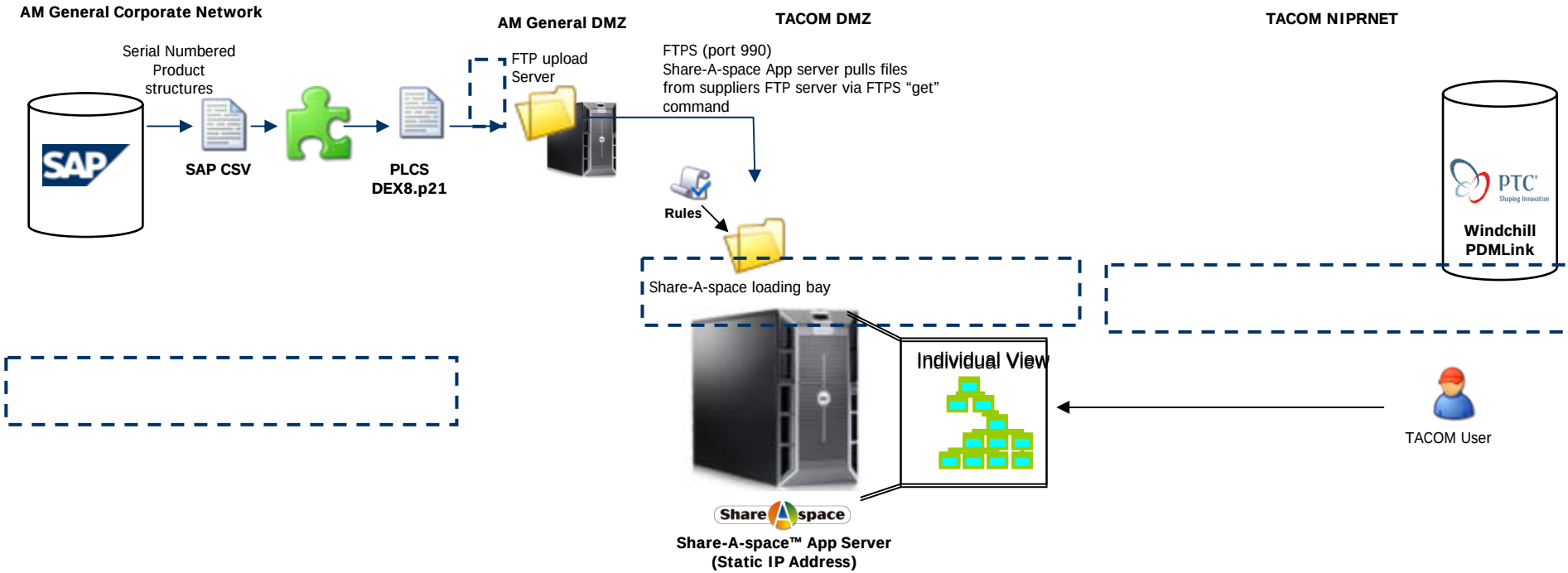


HMMWV Pilot – Demo Scenario

5. Load Vehicle instance data and view in Share-A-space

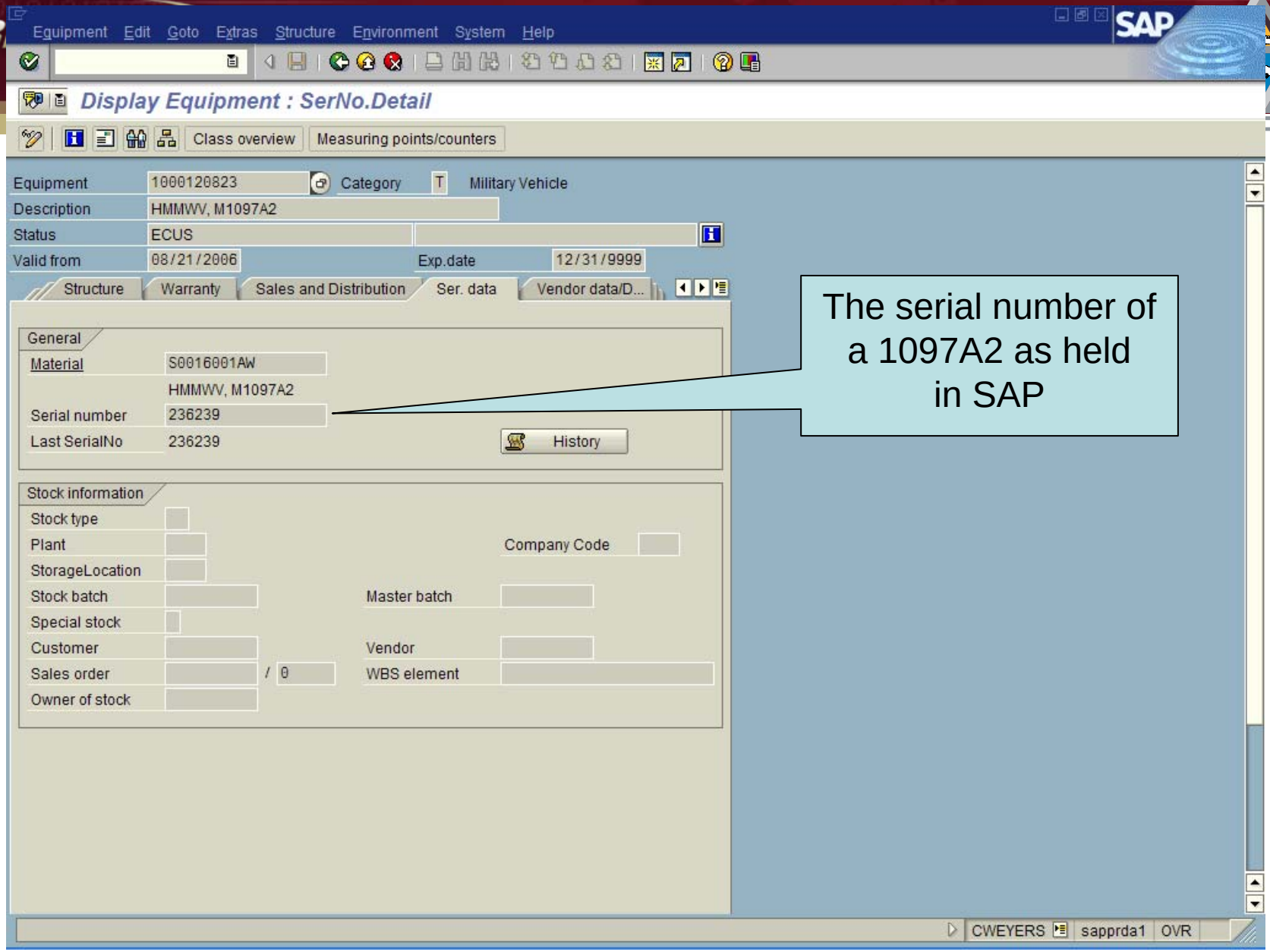
- Data on serial numbered structures exported from SAP
- Mapped into PLCS
- Loaded into Share-A-space
- Four serial numbered items per vehicle
  - plus the vehicle itself

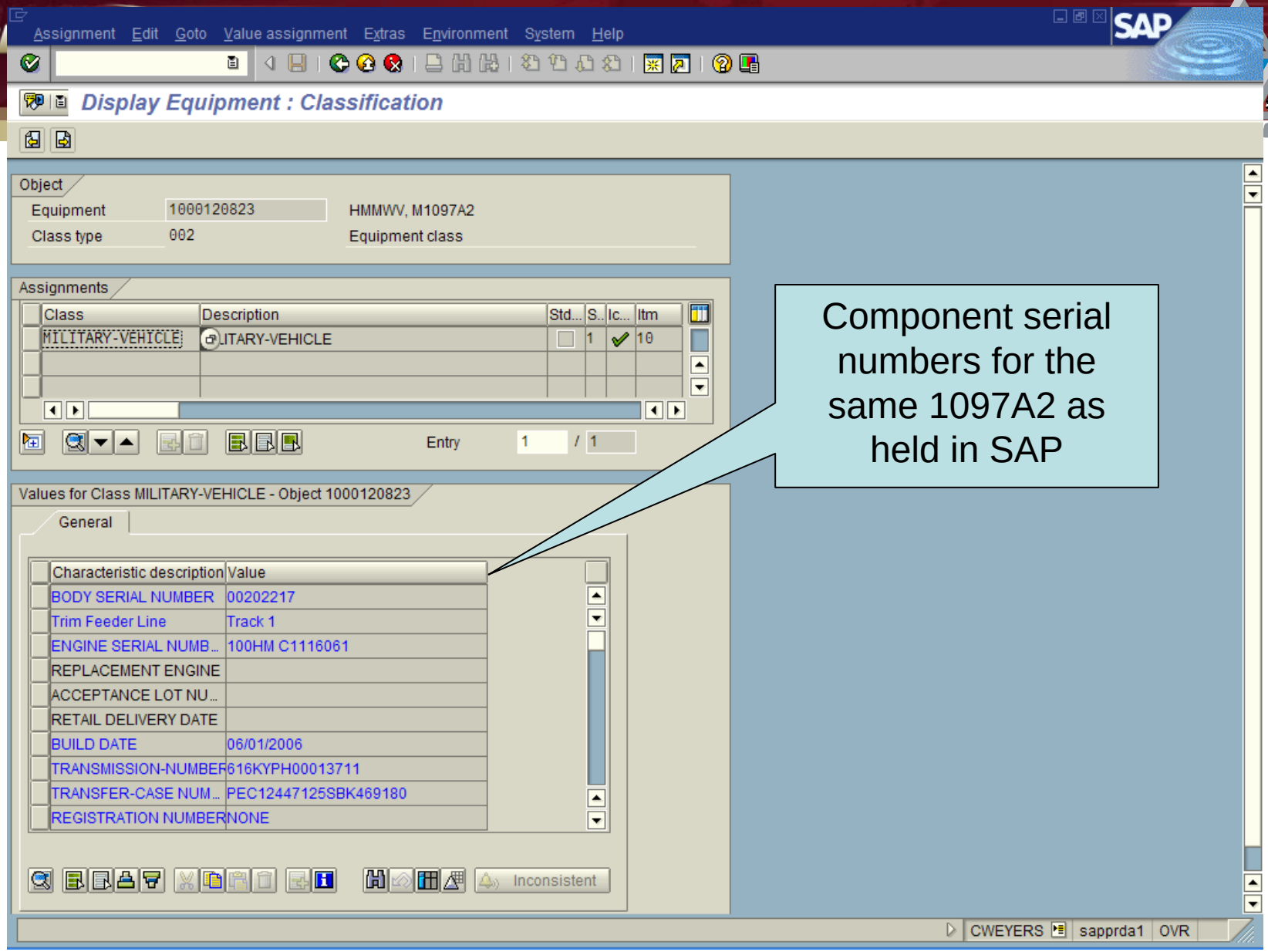
Load Serial Numbered Product Data – AM General SAP



powerLOG

Serial Numbered data can be viewed in Share-A-space Individual View via Plug-in to be developed


Equipment Edit Goto Extras Structure Environment System Help
SAP
Display Equipment : SerNo.Detail
Class overview
Measuring points/counters
Equipment 1000120823 Category T Military Vehicle
Description HMMWV, M1097A2
Status ECUS
Valid from 08/21/2006 Exp.date 12/31/9999
Structure Warranty Sales and Distribution Ser. data Vendor data/D...
General
Material S0016001AW
HMMWV, M1097A2
Serial number 236239
Last SerialNo 236239
History
Stock information
Stock type
Plant
Company Code
StorageLocation
Stock batch
Master batch
Special stock
Customer
Vendor
Sales order / 0
WBS element
Owner of stock
The serial number of a 1097A2 as held in SAP
CWEYERS sapprda1 OVR



Component serial numbers for the same 1097A2 as held in SAP

SAP export – Serial numbered data as Ascii file

600	229934	S0016001AU	"HMMWV, M1097A2"	2-Dec-2005		8750315	R	1000113361	000000001000113361
600	229940	S0016001AU	"HMMWV, M1097A2"	2-Dec-2005		8750315	R	1000113367	000000001000113367
600	229948	S0016001AU	"HMMWV, M1097A2"	2-Dec-2005		8750315	R	1000113374	000000001000113374
600	229952	S0016001AU	"HMMWV, M1097A2"	2-Dec-2005		8750315	R	1000113378	000000001000113378
600	229958	S0016001AU	"HMMWV, M1097A2"	2-Dec-2005		8750315	R	1000113384	000000001000113384
600	229970	S0016001AR	"HMMWV, M1097A2"	3-Dec-2005		8750315	R	1000113396	000000001000113396
600	229976	S0016001AR	"HMMWV, M1097A2"	3-Dec-2005		8750315	R	1000113402	000000001000113402
600	229992	S0016001AR	"HMMWV, M1097A2"	3-Dec-2005		8750315	R	1000113417	000000001000113417
600	229996	S0016001AR	"HMMWV, M1097A2"	3-Dec-2005		8750315	R	1000113421	000000001000113421
600	230002	S0016001AR	"HMMWV, M1097A2"	3-Dec-2005		8750315	R	1000113427	000000001000113427
600	230008	S0016001AR	"HMMWV, M1097A2"	5-Dec-2005		8750315	R	1000113433	000000001000113433
600	230014	S0016001AR	"HMMWV, M1097A2"	5-Dec-2005		8750315	R	1000113439	000000001000113439
600	230022	S0016001AR	"HMMWV, M1097A2"	5-Dec-2005		8750315	R	1000113475	000000001000113475
600	230038	S0016001AR	"HMMWV, M1097A2"	5-Dec-2005		8750315	R	1000113490	000000001000113490
600	230048	S0016001AR	"HMMWV, M1097A2"	5-Dec-2005		8750315	R	1000113500	000000001000113500
600	230064	S0016001AR	"HMMWV, M1097A2"	6-Dec-2005		8750315	R	1000113515	000000001000113515
600	230592	S0016001AR	"HMMWV, M1097A2"	6-Jan-2006		8750315	R	1000114074	000000001000114074
600	230600	S0016001AR	"HMMWV, M1097A2"	6-Jan-2006		8750315	R	1000114082	000000001000114082
600	230624	S0016001AR	"HMMWV, M1097A2"	20-Dec-2005		8750315	R	1000114105	000000001000114105
600	230644	S0016001AR	"HMMWV, M1097A2"	20-Dec-2005		8750315	R	1000114124	000000001000114124
600	230652	S0016001AR	"HMMWV, M1097A2"	20-Dec-2005		8750315	R	1000114132	000000001000114132
600	230776	S0016001AS	"HMMWV, M1097A2"	23-Dec-2005		8750315	R	1000114251	000000001000114251
600	230890	S0016001AR	"HMMWV, M1097A2"	3-Jan-2006		8750315	R	1000114365	000000001000114365
600	230902	S0016001AR	"HMMWV, M1097A2"	3-Jan-2006		8750315	R	1000114376	000000001000114376
600	230908	S0016001AR	"HMMWV, M1097A2"	3-Jan-2006		8750315	R	1000114382	000000001000114382
600	230920	S0016001AR	"HMMWV, M1097A2"	4-Jan-2006		8750315	R	1000114394	000000001000114394
600	230926	S0016001AR	"HMMWV, M1097A2"	4-Jan-2006		8750315	R	1000114399	000000001000114399
600	230936	S0016001AR	"HMMWV, M1097A2"	4-Jan-2006		8750315	R	1000114409	000000001000114409
600	230944	S0016001AR	"HMMWV, M1097A2"	4-Jan-2006		8750315	R	1000114417	000000001000114417
600	230966	S0016001AR	"HMMWV, M1097A2"	4-Jan-2006		8750315	R	1000114438	000000001000114438
600	230980	S0016001AR	"HMMWV, M1097A2"	5-Jan-2006		8750315	R	1000114451	000000001000114451
600	230992	S0016001AR	"HMMWV, M1097A2"	9-Jan-2006		8750315	R	1000114463	000000001000114463
600	231008	S0016001AR	"HMMWV, M1097A2"	5-Jan-2006		8750315	R	1000114478	000000001000114478
600	231010	S0016001AR	"HMMWV, M1097A2"	5-Jan-2006		8750315	R	1000114480	000000001000114480
600	231028	S0016001AR	"HMMWV, M1097A2"	6-Jan-2006		8750315	R	1000114498	000000001000114498
600	231038	S0016001AR	"HMMWV, M1097A2"	6-Jan-2006		8750315	R	1000114507	000000001000114507
600	231044	S0016001AR	"HMMWV, M1097A2"	6-Jan-2006		8750315	R	1000114513	000000001000114513
600	231143	S0016001AR	"HMMWV, M1097A2"	10-Jan-2006		8750315	R	1000114653	000000001000114653
600	231159	S0016001AT	"HMMWV, M1097A2"	10-Jan-2006		8750315	R	1000114668	000000001000114668
600	231161	S0016001AR	"HMMWV, M1097A2"	10-Jan-2006		8750315	R	1000114670	000000001000114670
600	231183	S0016001AT	"HMMWV, M1097A2"	11-Jan-2006		8750315	R	1000114691	000000001000114691

Serial Numbered data mapped to PLCS

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#2=PRODUCT_AS_INDIVIDUAL('/IGNORE','/IGNORE','/IGNORE');
#3=PRODUCT_AS_INDIVIDUAL('/IGNORE','/IGNORE','/IGNORE');
#4=PART('/IGNORE','/IGNORE','/IGNORE');
#5=PRODUCT_AS_INDIVIDUAL_VIEW('/IGNORE','/IGNORE','/IGNORE',#6,(),#7);
#8=PRODUCT_AS_INDIVIDUAL_VIEW('/IGNORE','/IGNORE','/IGNORE',#6,(),#9);
#10=EXTERNAL_CLASS('/IGNORE','Serial_identification_code','/IGNORE',#11);
#12=EXTERNAL_CLASS('/IGNORE','Organization_identification_code','/IGNORE',#11);
#14=EXTERNAL_CLASS('/IGNORE','Version_identification_code','/IGNORE',#11);
#15=EXTERNAL_CLASS('/IGNORE','In-Service','/IGNORE',#11);
#16=EXTERNAL_CLASS('/IGNORE','Maintenance','/IGNORE',#11);
#17=EXTERNAL_CLASS('/IGNORE','Part_identification_code','/IGNORE',#11);
#18=EXTERNAL_CLASS('/IGNORE','Development_stage','/IGNORE',#11);
#19=EXTERNAL_CLASS('/IGNORE','Mechanical_design','/IGNORE',#11);
#20=EXTERNAL_CLASS('/IGNORE','Name','/IGNORE',#11);
#21=EXTERNAL_CLASS('/IGNORE','Start_Date','/IGNORE',#11);
#11=EXTERNAL_CLASS_LIBRARY('urn:plcs:rdl:std','/IGNORE');
#36=CLASSIFICATION_ASSIGNMENT(#10,(#23),'/IGNORE');
#37=CLASSIFICATION_ASSIGNMENT(#12,(#38),'/IGNORE');
#53=CLASSIFICATION_ASSIGNMENT(#21,(#54),'/IGNORE');
#55=CLASSIFICATION_ASSIGNMENT(#10,(#33),'/IGNORE');
#56=CLASSIFICATION_ASSIGNMENT(#13,(#32),'/IGNORE');
#57=CLASSIFICATION_ASSIGNMENT(#20,(#35),'/IGNORE');
#58=CLASSIFICATION_ASSIGNMENT(#13,(#34),'/IGNORE');
#59=CLASSIFICATION_ASSIGNMENT(#21,(#60),'/IGNORE');
#7=PRODUCT_AS_REALIZED('/IGNORE','/IGNORE',#2);
#9=PRODUCT_AS_REALIZED('/IGNORE','/IGNORE',#3);
#61=PART_VERSION('/IGNORE','/IGNORE',#4);
#6=VIEW_DEFINITION_CONTEXT('/IGNORE','/IGNORE','/IGNORE');
#49=VIEW_DEFINITION_CONTEXT('/IGNORE','/IGNORE','/IGNORE');
#62=PRODUCT_CATEGORY('/IGNORE','part','/IGNORE');
#63=PART_VIEW_DEFINITION('/IGNORE','/IGNORE','/IGNORE',#49,(),#61);
#64=PRODUCT_DESIGN_VERSION_TO_INDIVIDUAL(#61,#7);
#65=PRODUCT_DESIGN_VERSION_TO_INDIVIDUAL(#61,#9);
#66=PRODUCT_DESIGN_TO_INDIVIDUAL(#4,#2);
#67=PRODUCT_DESIGN_TO_INDIVIDUAL(#4,#3);
#54=DATE_OR_DATE_TIME_ASSIGNMENT(#68,'/IGNORE',(#7));
#60=DATE_OR_DATE_TIME_ASSIGNMENT(#69,'/IGNORE',(#9));
#68=CALENDAR_DATE(2005,12,2);
#69=CALENDAR_DATE(2005,12,3);
#23=IDENTIFICATION_ASSIGNMENT('229934','/IGNORE','$',(#2));
#38=IDENTIFICATION_ASSIGNMENT('9C234','/IGNORE','/IGNORE',(#1));
#25=IDENTIFICATION_ASSIGNMENT(' ','/IGNORE','$',(#7,#9));
#27=IDENTIFICATION_ASSIGNMENT('8750315','/IGNORE','$',(#4));
#29=IDENTIFICATION_ASSIGNMENT('R','/IGNORE','$',(#61));
#31=IDENTIFICATION_ASSIGNMENT('S0016001AU','/IGNORE','$',(#2));
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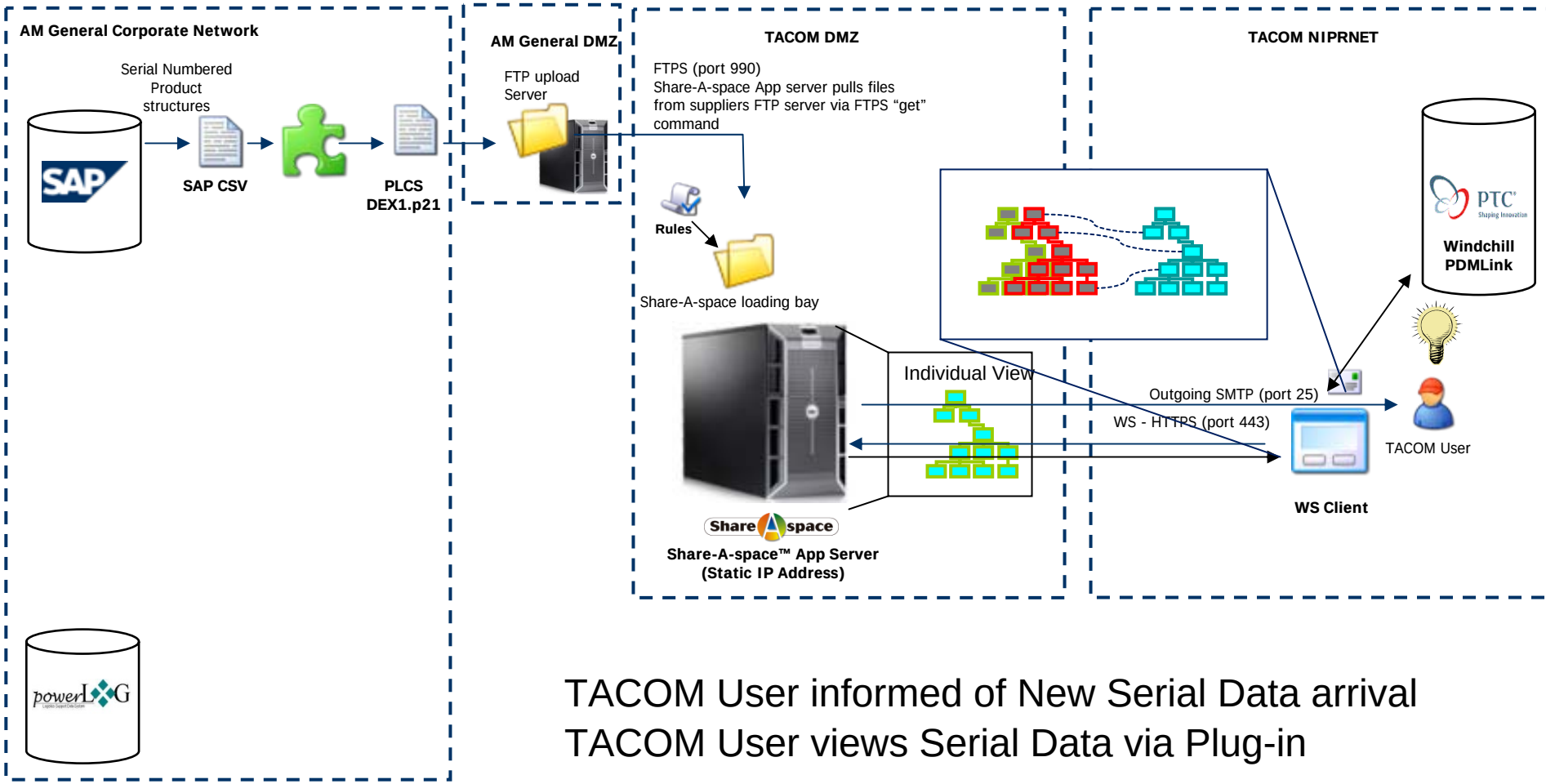
Viewing of Serial data from Windchill Plug-in



TACOM User informed of New Serial Data arrival
TACOM User views Serial Data via Plug-in

Conclusions

- The architecture proposed for FALCON has been successfully demonstrated with AM General
  - The PLCS standard and Share-A-space technology provide a “master data integrator” function
  - TARDEC and AM General continue to use existing systems
- Through FALCON, TARDEC can have access to a richer data set from OEMs
  - As-used-to-manufacture data and LSAR data available at TARDEC as well as approved design
  - Access to the data can be made available through TARDEC’s existing tool (Windchill)
- FALCON enables a route for improved data synchronization between AM General and TARDEC
  - Automated processes can be established
  - Manual intervention in the exchange of data can be eliminated
  - Out of Sync data can be identified

Conclusions (continued)

- FALCON delivers improved Data Quality
  - Inconsistencies identified between As-released and As-used-to-manufacture
    - Version differences
    - Part numbering and naming differences
  - Different names between LSAR and As-released for same part
- FALCON enables use of simple add-on services via web-services
  - Bill-of-Material comparator (part of the Plug-in)
- FALCON offers the possibility of a through life approach
  - Individual (serialized) data from SAP now available to TARDEC
  - Starting point for tracking configuration of individual vehicles
  - Individual and support data in line with PLCS

Summary

- FALCON's use of PLCS as the mediation format and Share-A-space as a host technology provide:
  - Reconciliation of product data cross-application
  - Configuration control of lifecycle views
  - Transparent interoperability services
  - Independence between OEM and Army IT systems
  - Platform for additional application capability
  - Absence of data lock-in
- FALCON approach applicable to other vehicle programs
  - Demonstration achieved using open approaches without company specific developments